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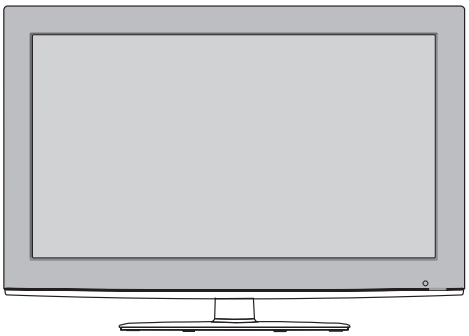
LCD TV
SERVICE MANUAL

CHASSIS : LP91J

MODEL : 26LK310/310Y 26LK310/310Y-TA
26LK311 26LK311-TB

CAUTION
BEFORE SERVICING THE CHASSIS,
READ THE SAFETY PRECAUTIONS IN THIS MANUAL.



P/NO : MFL62461531 (1104-REV01)

Printed in Korea

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SAFETY PRECAUTIONS

IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by ⚠ in the Schematic Diagram and Exploded View.
It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent Shock, Fire, or other Hazards.
Do not modify the original design without permission of manufacturer.

General Guidance

An **isolation Transformer should always be used** during the servicing of a receiver whose chassis is not isolated from the AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injury from electrical shocks.

It will also protect the receiver and it's components from being damaged by accidental shorts of the circuitry that may be inadvertently introduced during the service operation.

If any fuse (or Fusible Resistor) in this TV receiver is blown, replace it with the specified.

When replacing a high wattage resistor (Oxide Metal Film Resistor, over 1W), keep the resistor 10mm away from PCB.

Keep wires away from high voltage or high temperature parts.

Before returning the receiver to the customer,

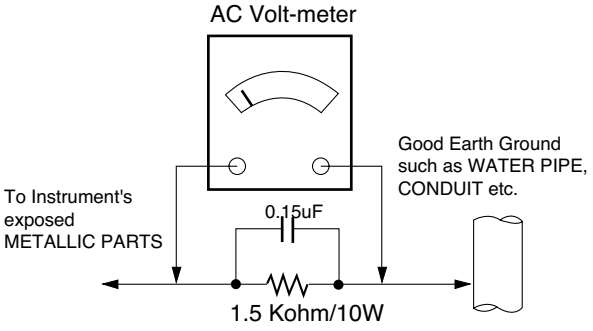
always perform an **AC leakage current check** on the exposed metallic parts of the cabinet, such as antennas, terminals, etc., to be sure the set is safe to operate without damage of electrical shock.

Leakage Current Cold Check(Antenna Cold Check)
With the instrument AC plug removed from AC source, connect an electrical jumper across the two AC plug prongs. Place the AC switch in the on position, connect one lead of ohm-meter to the AC plug prongs tied together and touch other ohm-meter lead in turn to each exposed metallic parts such as antenna terminals, phone jacks, etc.
If the exposed metallic part has a return path to the chassis, the measured resistance should be between 1MΩ and 5.2MΩ.
When the exposed metal has no return path to the chassis the reading must be infinite.
An other abnormality exists that must be corrected before the receiver is returned to the customer.

Leakage Current Hot Check (See below Figure)
Plug the AC cord directly into the AC outlet.

Do not use a line Isolation Transformer during this check.
Connect 1.5K/10watt resistor in parallel with a 0.15uF capacitor between a known good earth ground (Water Pipe, Conduit, etc.) and the exposed metallic parts.
Measure the AC voltage across the resistor using AC voltmeter with 1000 ohms/volt or more sensitivity.
Reverse plug the AC cord into the AC outlet and repeat AC voltage measurements for each exposed metallic part. Any voltage measured must not exceed 0.75 volt RMS which is corresponds to 0.5mA.
In case any measurement is out of the limits specified, there is possibility of shock hazard and the set must be checked and repaired before it is returned to the customer.

Leakage Current Hot Check circuit



When 25A is impressed between Earth and 2nd Ground for 1 second, Resistance must be less than 0.1 Ω
*Base on Adjustment standard

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SERVICING PRECAUTIONS

CAUTION: Before servicing receivers covered by this service manual and its supplements and addenda, read and follow the SAFETY PRECAUTIONS on page 3 of this publication.
NOTE: If unforeseen circumstances create conflict between the following servicing precautions and any of the safety precautions on page 3 of this publication, always follow the safety precautions. Remember: Safety First.

General Servicing Precautions

1. Always unplug the receiver AC power cord from the AC power source before;
   a. Removing or reinstalling any component, circuit board module or any other receiver assembly.
   b. Disconnecting or reconnecting any receiver electrical plug or other electrical connection.
   c. Connecting a test substitute in parallel with an electrolytic capacitor in the receiver.
   CAUTION: A wrong part substitution or incorrect polarity installation of electrolytic capacitors may result in an explosion hazard.

2. Test high voltage only by measuring it with an appropriate high voltage meter or other voltage measuring device (DVM, FETVOM, etc) equipped with a suitable high voltage probe.
   Do not test high voltage by "drawing an arc".
3. Do not spray chemicals on or near this receiver or any of its assemblies.
4. Unless specified otherwise in this service manual, clean electrical contacts only by applying the following mixture to the contacts with a pipe cleaner, cotton-tipped stick or comparable non-abrasive applicator; 10% (by volume) Acetone and 90% (by volume) isopropyl alcohol (90%-99% strength)
   CAUTION: This is a flammable mixture.
   Unless specified otherwise in this service manual, lubrication of contacts in not required.
5. Do not defeat any plug/socket B+ voltage interlocks with which receivers covered by this service manual might be equipped.
6. Do not apply AC power to this instrument and/or any of its electrical assemblies unless all solid-state device heat sinks are correctly installed.
7. Always connect the test receiver ground lead to the receiver chassis ground before connecting the test receiver positive lead.
   Always remove the test receiver ground lead last.
8. Use with this receiver only the test fixtures specified in this service manual.
   CAUTION: Do not connect the test fixture ground strap to any heat sink in this receiver.

Electrostatically Sensitive (ES) Devices

Some semiconductor (solid-state) devices can be damaged easily by static electricity. Such components commonly are called Electrostatically Sensitive (ES) Devices. Examples of typical ES devices are integrated circuits and some field-effect transistors and semiconductor "chip" components. The following techniques should be used to help reduce the incidence of component damage caused by static by static electricity.

1. Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed to prevent potential shock reasons prior to applying power to the unit under test.
2. After removing an electrical assembly equipped with ES devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.
3. Use only a grounded-tip soldering iron to solder or unsolder ES devices.
4. Use only an anti-static type solder removal device. Some solder removal devices not classified as "anti-static" can generate electrical charges sufficient to damage ES devices.
5. Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ES devices.
6. Do not remove a replacement ES device from its protective package until immediately before you are ready to install it. (Most replacement ES devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive material).
7. Immediately before removing the protective material from the leads of a replacement ES device, touch the protective material to the chassis or circuit assembly into which the device will be installed.
   CAUTION: Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.
8. Minimize bodily motions when handling unpackaged replacement ES devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity sufficient to damage an ES device.)

General Soldering Guidelines

1. Use a grounded-tip, low-wattage soldering iron and appropriate tip size and shape that will maintain tip temperature within the range or 500°F to 600°F.
2. Use an appropriate gauge of RMA resin-core solder composed of 60 parts tin/40 parts lead.
3. Keep the soldering iron tip clean and well tinned.
4. Thoroughly clean the surfaces to be soldered. Use a mall wire-bristle (0.5 inch, or 1.25cm) brush with a metal handle.
   Do not use freon-propelled spray-on cleaners.
5. Use the following unsoldering technique
   a. Allow the soldering iron tip to reach normal temperature. (500°F to 600°F)
   b. Heat the component lead until the solder melts.
   c. Quickly draw the melted solder with an anti-static, suction-type solder removal device or with solder braid.
   CAUTION: Work quickly to avoid overheating the circuit board printed foil.
6. Use the following soldering technique.
   a. Allow the soldering iron tip to reach a normal temperature (500°F to 600°F)
   b. First, hold the soldering iron tip and solder the strand against the component lead until the solder melts.
   c. Quickly move the soldering iron tip to the junction of the component lead and the printed circuit foil, and hold it there only until the solder flows onto and around both the component lead and the foil.
   CAUTION: Work quickly to avoid overheating the circuit board printed foil.
   d. Closely inspect the solder area and remove any excess or splashed solder with a small wire-bristle brush.

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IC Remove/Replacement

Some chassis circuit boards have slotted holes (oblong) through which the IC leads are inserted and then bent flat against the circuit foil. When holes are the slotted type, the following technique should be used to remove and replace the IC. When working with boards using the familiar round hole, use the standard technique as outlined in paragraphs 5 and 6 above.

Removal

1. Desolder and straighten each IC lead in one operation by gently prying up on the lead with the soldering iron tip as the solder melts.
2. Draw away the melted solder with an anti-static suction-type solder removal device (or with solder braid) before removing the IC.

Replacement

1. Carefully insert the replacement IC in the circuit board.
2. Carefully bend each IC lead against the circuit foil pad and solder it.
3. Clean the soldered areas with a small wire-bristle brush. (It is not necessary to reapply acrylic coating to the areas).

"Small-Signal" Discrete Transistor Removal/Replacement

1. Remove the defective transistor by clipping its leads as close as possible to the component body.
2. Bend into a "U" shape the end of each of three leads remaining on the circuit board.
3. Bend into a "U" shape the replacement transistor leads.
4. Connect the replacement transistor leads to the corresponding leads extending from the circuit board and crimp the "U" with long nose pliers to insure metal to metal contact then solder each connection.

Power Output, Transistor Device Removal/Replacement

1. Heat and remove all solder from around the transistor leads.
2. Remove the heat sink mounting screw (if so equipped).
3. Carefully remove the transistor from the heat sink of the circuit board.
4. Insert new transistor in the circuit board.
5. Solder each transistor lead, and clip off excess lead.
6. Replace heat sink.

Diode Removal/Replacement

1. Remove defective diode by clipping its leads as close as possible to diode body.
2. Bend the two remaining leads perpendicular y to the circuit board.
3. Observing diode polarity, wrap each lead of the new diode around the corresponding lead on the circuit board.
4. Securely crimp each connection and solder it.
5. Inspect (on the circuit board copper side) the solder joints of the two "original" leads. If they are not shiny, reheat them and if necessary, apply additional solder.

Fuse and Conventional Resistor Removal/Replacement

1. Clip each fuse or resistor lead at top of the circuit board hollow stake.
2. Securely crimp the leads of replacement component around notch at stake top.
3. Solder the connections.
   CAUTION: Maintain original spacing between the replaced component and adjacent components and the circuit board to prevent excessive component temperatures.

Circuit Board Foil Repair

Excessive heat applied to the copper foil of any printed circuit board will weaken the adhesive that bonds the foil to the circuit board causing the foil to separate from or "lift-off" the board. The following guidelines and procedures should be followed whenever this condition is encountered.

At IC Connections

To repair a defective copper pattern at IC connections use the following procedure to install a jumper wire on the copper pattern side of the circuit board. (Use this technique only on IC connections).

1. Carefully remove the damaged copper pattern with a sharp knife. (Remove only as much copper as absolutely necessary).
2. carefully scratch away the solder resist and acrylic coating (if used) from the end of the remaining copper pattern.
3. Bend a small "U" in one end of a small gauge jumper wire and carefully crimp it around the IC pin. Solder the IC connection.
4. Route the jumper wire along the path of the out-away copper pattern and let it overlap the previously scraped end of the good copper pattern. Solder the overlapped area and clip off any excess jumper wire.

At Other Connections

Use the following technique to repair the defective copper pattern at connections other than IC Pins. This technique involves the installation of a jumper wire on the component side of the circuit board.

1. Remove the defective copper pattern with a sharp knife. Remove at least 1/4 inch of copper, to ensure that a hazardous condition will not exist if the jumper wire opens.
2. Trace along the copper pattern from both sides of the pattern break and locate the nearest component that is directly connected to the affected copper pattern.
3. Connect insulated 20-gauge jumper wire from the lead of the nearest component on one side of the pattern break to the lead of the nearest component on the other side. Carefully crimp and solder the connections.
   CAUTION: Be sure the insulated jumper wire is dressed so the it does not touch components or sharp edges.

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SPECIFICATION

NOTE : Specifications and others are subject to change without notice for improvement.

1. Application range

This spec sheet is applied to LCD TV used LP91J chassis.

2. Specification

Each part is tested as below without special appointment.

1) Temperature : 25±5ºC (77±9ºF), CST : 40±5ºC
2) Relative Humidity : 65±10%
3) Power Voltage: Standard input voltage(100-240 V~, 50/60 Hz)
   * Standard Voltage of each products is marked by models.
4) Specification and performance of each parts are followed each drawing and specification by part number in accordance with BOM.
5) The receiver must be operated for about 5 minutes prior to the adjustment.

3. Test method

1) Performance: LGE TV test method followed
2) Demanded other specification
   - Safety: CE, IEC specification
   - EMC : CE, IEC

4. Electrical specification

4.1. Model Specification

No	Item		Specification				Remark
1.	Market		NON EU				
2.	Broadcasting system		PAL/SECAM B/G/D/K, PAL I/II, NTSC-M				
3.	Available Channel	BAND	PAL	NTSC	China(DK)	Australia(BG)	
		VHF/UHF	E2-C69	2~78	C1~C62	C1~C75	
		CATV	S21~S47	1~71	S1~S41	S2~S44	
4.	Receiving system		Upper Heterodyne				
5.	Video Input		PAL, SECAM, NTSC				22LK310/311 : Rear 1EA, 26/32LK310/311 : Rear 1EA, Side 1EA
6.	Component Input		Y/Cb/Cr, Y/ Pb/Pr				Rear
7.	RGB Input		RGB-PC, S/W Upgrade				Rear
8.	HDMI Input		HDMI-DTV, Only PCM MODE				26/32LK310/311 Rear 2EA
							22LK310/311 Rear 1EA
9.	Audio Input (4EA)		PC Audio, Component, AV (2EA)				L/R Input (22LK310/311: AV Audio Input 1EA)
10.	RS-232C		Remote control, Commercial control				Rear
11.	USB Input (1EA)		Divx, MP3, JPEG				Only Side

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5. Component Video Input (Y, P_B, P_R)

No	Specification				Remark
	Resolution	H-freq(kHz)	V-freq(Hz)	Pixel Clock(MHz)	
1	720* 480	15.73	59.94	13.500	SDTV, DVD 480I(525I)
2	720* 480	15.75	60.00	13.514	SDTV, DVD 480I(525I)
3	720* 576	15.625	50.00	13.500	SDTV, DVD 576I(625I) 50 Hz
4	720* 480	31.47	59.94	27.000	SDTV 480P
5	720* 480	31.50	60.00	27.027	SDTV 480P
6	720* 576	31.25	50.00	27.000	SDTV 576P 50 Hz
7	1280* 720	44.96	59.94	74.176	HDTV 720P
8	1280* 720	45.00	60.00	74.250	HDTV 720P
9	1280* 720	37.50	50.00	74.25	HDTV 720P 50 Hz
10	1920* 1080	28.125	50.00	74.250	HDTV 1080I 50 Hz
11	1920* 1080	33.72	59.94	74.176	HDTV 1080I
12	1920* 1080	33.75	60.00	74.25	HDTV 1080I
13	1920* 1080	56.25	50	148.5	HDTV 1080P
14	1920* 1080	67.432	59.94	148.350	HDTV 1080P
15	1920* 1080	67.5	60.00	148.5	HDTV 1080P

6. RGB

(Analog PC, RGB-DTV - NOT SUPPORT)

No	Specification				Proposed	Remark
	Resolution	H-freq(kHz)	V-freq(Hz)	Pixel Clock(MHz)		
1	640* 350	31.468	70.09	25.17	EGA	
2	720* 400	31.469	70.09	28.32	DOS	
3	640* 480	31.469	59.94	25.17	VESA(VGA)	
4	800* 600	37.879	60.317	40	VESA(SVGA)	
5	1024* 768	48.363	60.004	65	VESA(XGA)	
6	1280* 768	47.776	59.87	79.5	VESA(WXGA)	
7	1360* 768	47.72	59.799	84.75	VESA(WXGA)	

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7. HDMI input - PC

(Spec. out but it can be shown the picture at only HDMI/DVI IN 1 via DVI to HDMI Cable)

No	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed	Remarks
1	640 x 480	31.469	59.94	25.17	VESA(VGA)	
2	800 x 600	37.879	60.317	40.00	VESA(SVGA)	
3	1024 x 768	48.363	60.004	65.00	VESA(XGA)	
4	1280 x 768	47.776	59.87	79.5	VESA(WXGA)	
5	1360 x 768	47.72	59.799	84.62	VESA(WXGA)	
6	1366 x 768	47.7	60.00	84.62	WXGA	
7	1280 x 1024	63.595	60.00	108.875	SXGA	
8	1920 x 1080	66.647	59.988	138.625	WUXGA	

8. HDMI input (DTV)

No	Specification				Proposed	Remarks
	Resolution	H-freq(kHz)	V-freq(Hz)	Pixel Clock(MHz)		
1	720 x 480	15.73	59.94	13.500	SDTV, DVD 480I(525I)	Spec. out but display.
2	720 x 480	15.75	60.00	13.514	SDTV, DVD 480I(525I)	
3	720 x 576	15.625	50.00	13.500	SDTV, DVD 576I(625I) 50 Hz	
4	720 x 480	31.47	59.94	27	SDTV 480P	
5	720 x 480	31.5	60.00	27.027	SDTV 480P	
6	720 x 576	31.25	50.00	27	SDTV 576P	
7	1280 x 720	44.96	59.94	74.176	HDTV 720P	
8	1280 x 720	45	60.00	74.25	HDTV 720P	
9	1280 x 720	37.5	50.00	74.25	HDTV 720P	
10	1920 x 1080	28.125	50.00	74.25	HDTV 1080I	
11	1920 x 1080	33.72	59.94	74.176	HDTV 1080I	
12	1920 x 1080	33.75	60.00	74.25	HDTV 1080I	
13	1920 x 1080	56.25	50.00	148.5	HDTV 1080P	
14	1920 x 1080	67.432	59.94	148.350	HDTV 1080P	
15	1920 x 1080	67.5	60.00	148.5	HDTV 1080P	
16	1920 x 1080	27	24.00	74.25	HDTV 1080P	
17	1920 x 1080	33.75	30.00	74.25	HDTV 1080P	

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ADJUSTMENT INSTRUCTION

1. Application Range

This specification sheet is applied to all of the LCD TV, LP91J chassis.

2. Specification

1) Because this is not a hot chassis, it is not necessary to use an isolation transformer. However, the use of isolation transformer will help protect test instrument.
2) Adjustment must be done in the correct order.
3) The adjustment must be performed in the circumstance of 25 °C ± 5 °C of temperature and 65 % ± 10 % of relative humidity if there is no specific designation.
4) The input voltage of the receiver must keep 100-220 V, 50/60 Hz.
5) Before adjustment, execute Heat-Run for 5 minutes at RF no signal.

3. Adjustment items

3.1. PCB assembly adjustment items

(1) Download the MSTAR main software
(IC800, Mstar ISP Utility)
1) Using D/L Jig
2) Using USB Memory Stick.
(2) Input Tool-Option/Area option.
(3) Download the EDID
- EDID datas are automatically download when adjusting the Tool Option2
(4) ADC Calibration - RGB / Component
(4) Check SW Version.

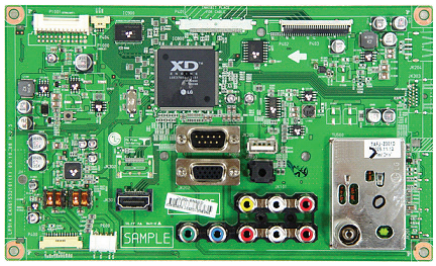
3.2. SET assembly adjustment items

(1) Input Area option
(2) Adjustment of White Balance : Auto & Manual
(3) Input Tool-Option/Area option
(4) Intelligent Sensor Inspection Guide
(5) Preset CH information
(6) Factoring Option Data input

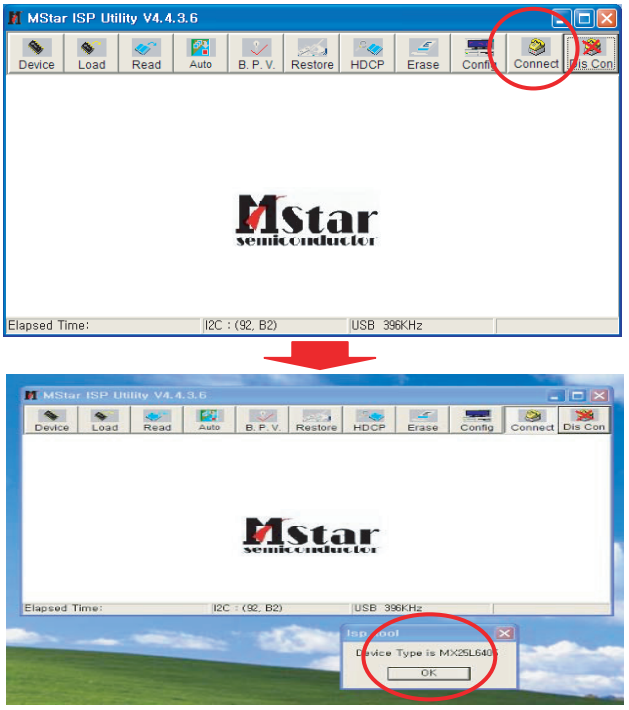
4. PCB assembly adjustment method

4.1. Mstar Main S/W program download

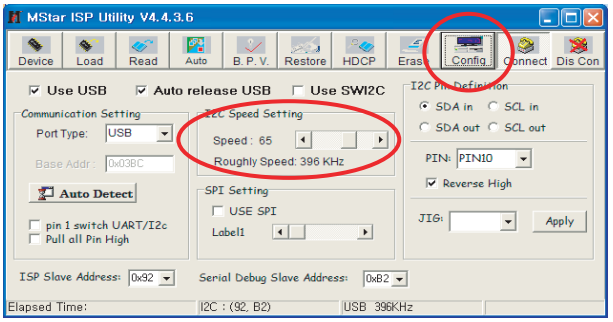
4.1.1. Using D/L Jig
(1) Preliminary steps
1) Connect the download jig to D-sub(RGB) jack



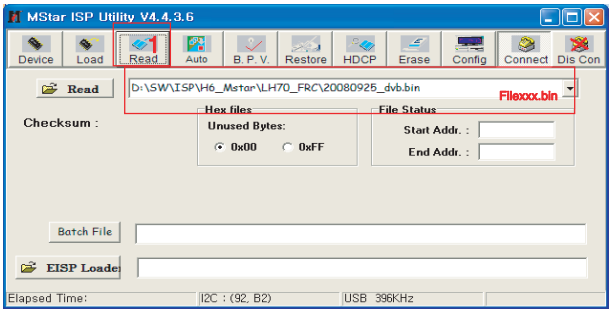
(2) Download steps
1) Execute 'ISP Tool' program, the main window(Mstar ISP utility Vx.x.x) will be opened.
2) Click the "Connect" button and confirm "Dialog Box".



3) Click the "Config." button and Change speed I2C Speed setting : 350 Khz ~ 400 Khz.



4) Read and write bin file.
Click "(1)Read" tab, and then load download file (XXXX.bin) by clicking "Read".



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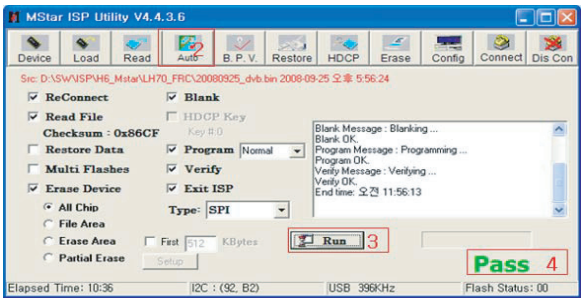
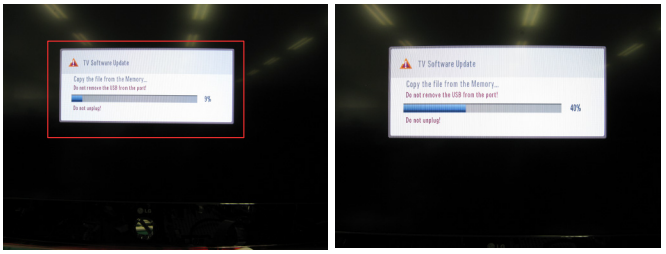
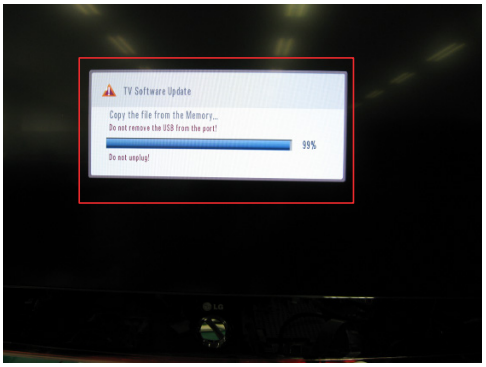
5) Click “(2)Auto” tab and set as below.
6) Click “(3)Run”.
7) After downloading, you can see the “(4)Pass” message.



4.1.2. Using the Memory Stick
* USB download : Service Mode
1) Insert the USB memory stick to the USB port.
2) Automatically detect the SW Version.
-> S/W download process is executed automatically.
3) Show the message “Copy the file from the Memory”



4) After Finished the Download, Automatically DC Off -> On



5) If the TV is turn on, check the updated SW Version and tool option.

4.2. Input tool option

Adjust tool option refer to the BOM.
- Tool Option Input : PCBA Check Process
- Area Option Input : Set Assembly Process

After Input Tool Option and AC off
Before PCBA check, you have to change the Tool option and have to AC off/on (Plug out and in)
(If missing this process, set can operate abnormally)

(1) Profile : Must be changed the option value because being different with some setting value depend on module maker, inch and market.
(2) Equipment : adjustment remote control.

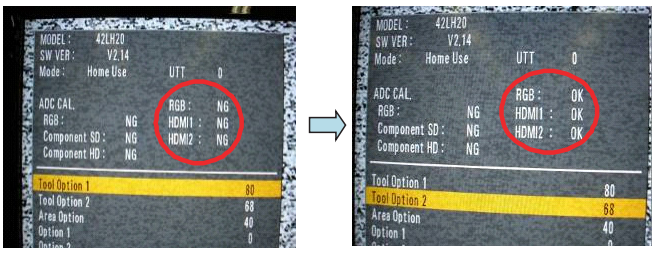
(3). Adjustment method
- The input methods are same as other chassis.(Use IN-START key on the Adjust remote control.)
(If not changed the option, the input menu can differ the model spec.)

Refer to Job Expression of each main chassis assembly (EBTxxxxxxxx) for Option value
Caution : Don’t Press “IN-STOP” key after completing the function inspection.

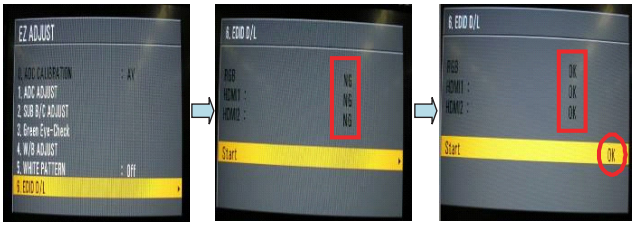
4.3. EDID Download method

Recommend that don’t connect HDMI and RGB(D-SUB) cable when downloading the EDID. If not possible, recommend that connect the MSPG equipment.
There are two methods of downloading the EDID data.

4.3.1. 1st Method
EDID datas are automatically downloaded when adjusting the Tool Option2.
Automatically downloaded when pushing the enter key after adjusting the tool option2.
It takes about 2 seconds.



4.3.2. 2nd Method
* Caution :
Must be checked that the tool option is right or not.
If tool option is wrong, HDMI EDID data could not be downloaded well.
1) Press the ADJ key
2) Move to the EDID D/L and Press the right direction key(►)
3) Press the right direction key(►) at Start.
4) After about a few seconds, appear “OK”, then complete.



4.3.3. RS-232C command Method
(1) Command : AE 00 10

* Caution
Don’t connect HDMI and RGB(D-SUB) cable when downloading the EDID.
If the cables are connected, Downloading of EDID could be failed.

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4.3.4. EDID data

(1) Analog(RGB): 128bytes>

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01
10	01	15	01	03	08	46	27	78	0A	D9	B0	A3	57	49	9C	25
20	11	49	4B	A1	08	00	45	40	01	01	61	40	01	01	01	01
30	01	01	01	01	01	01	1B	21	50	A0	51	00	1E	30	48	88
40	35	00	BC	88	21	00	00	1C	0E	1F	00	80	51	00	1E	30
50	40	80	37	00	BC	88	21	00	00	18	00	00	00	FC	00	4C
60	47	20	54	56	0A	20	20	20	20	20	20	20	00	00	00	FD
70	00	3A	3F	1C	44	0F	00	0A	20	20	20	20	20	20	00	55

(2) HDMI 1 : 256Bytes

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01
10	01	15	01	03	80	46	27	78	0A	D9	B0	A3	57	49	9C	25
20	11	49	4B	21	08	00	45	40	01	01	61	40	01	01	01	01
30	01	01	01	01	01	01	01	1D	00	72	51	D0	1E	20	6E	28
40	55	00	C4	8E	21	00	00	1E	1B	21	50	A0	51	00	1E	30
50	48	88	35	00	BC	77	21	00	00	1C	00	00	00	FC	00	4C
60	47	20	54	56	0A	20	20	20	20	20	20	20	00	00	00	FD
70	00	3A	3F	1C	44	0F	00	0A	20	20	20	20	20	20	01	C2
80	02	03	25	F1	4F	84	07	01	16	02	03	11	12	13	14	05
90	20	22	1F	10	23	09	07	07	83	01	00	00	68	03	0C	00
A0	10	00	80	1E	00	01	1D	00	80	51	D0	1C	20	40	80	35
B0	00	BC	88	21	00	00	1E	8C	0A	D0	8A	20	E0	2D	10	10
C0	3E	96	00	13	8E	21	00	00	18	8C	0A	A0	14	51	F0	16
D0	00	26	7C	43	00	C4	8E	21	00	00	98	01	1D	80	18	71
E0	1C	16	20	58	2C	25	00	C4	8E	21	00	00	9E	00	00	00
F0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	2A

(3) HDMI 2 : 256Bytes

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01
10	01	15	01	03	80	46	27	78	0A	D9	B0	A3	57	49	9C	25
20	11	49	4B	21	08	00	45	40	01	01	61	40	01	01	01	01
30	01	01	01	01	01	01	01	1D	00	72	51	D0	1E	20	6E	28
40	55	00	C4	8E	21	00	00	1E	1B	21	50	A0	51	00	1E	30
50	48	88	35	00	BC	77	21	00	00	1C	00	00	00	FC	00	4C
60	47	20	54	56	0A	20	20	20	20	20	20	20	00	00	00	FD
70	00	3A	3F	1C	44	0F	00	0A	20	20	20	20	20	20	01	C2
80	02	03	25	F1	4F	84	07	01	16	02	03	11	12	13	14	05
90	20	22	1F	10	23	09	07	07	83	01	00	00	68	03	0C	00
A0	20	00	80	1E	00	01	1D	00	80	51	D0	1C	20	40	80	35
B0	00	BC	88	21	00	00	1E	8C	0A	D0	8A	20	E0	2D	10	10
C0	3E	96	00	13	8E	21	00	00	18	8C	0A	A0	14	51	F0	16
D0	00	26	7C	43	00	C4	8E	21	00	00	98	01	1D	80	18	71
E0	1C	16	20	58	2C	25	00	C4	8E	21	00	00	9E	00	00	00
F0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	1A

4.4. ADC Calibration

4.4.1. ADC Calibration - Component (Using External pattern)

(1) Required Equipments

- Remote control for adjustment
- MSPG-925F/MSPG-1025/MSPG-3233 Pattern Generator

(2) Process

1) Change the Input to Component1 or 2 mode.
2) Input the Component 480i@60 Hz 100 % Color Bar YPbPr signal into Component1 or 2.
(MSPG-925F Model: 209 / Pattern: 65)

3) Press ADJ key on Remote control for adjustment.
4) Enter Password number. Password is “0 0 0 0”.
5) Select “0. ADC calibration : Component” by using ▲/▼ (CH +/-) and press ENTER(■).
6) ADC adjustment is executed automatically .
7) When ADC adjustment is finished, this OSD appear.

4.4.2. ADC Calibration - RGB

4.4.2.1. Method of Using External pattern

(1) Required Equipments

- Remote control for adjustment
- MSPG-925F/MSPG-1025/MSPG-3233 Pattern Generator

(2) Process

1) Change the Input to RGB mode..
2) Input the PC 1024x768@60 Hz Horizontal Color Bar signal into RGB. (MSPG-925F Model: 60 / Pattern: 65)

3) Press ADJ key on remote control for adjustment.
4) Enter Password number. Password is “0 0 0 0”.
5) Select “0. ADC calibration : RGB” by using ▲/▼(CH +/-) and press ENTER(■).
6) ADC adjustment is executed automatically .
7) When ADC adjustment is finished, this OSD appear.

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4.4.2.1. Method of Using Internal pattern

(1) Apply model : 22/26/32LK310/311

(2) Process

1) Change the Input to RGB mode..

2) Press ADJ key on remote control for adjustment.

3) Enter Password number. Password is “0 0 0 0”.

4) Select “0. ADC calibration : RGB” by using ▲/▼(CH +/-) and press ENTER(■).

5) ADC adjustment is executed automatically .

6) When ADC adjustment is finished, this OSD appear.

* Caution : No need to connect external input cable.

* Caution : Adjustment result is applied after SET Off/On.

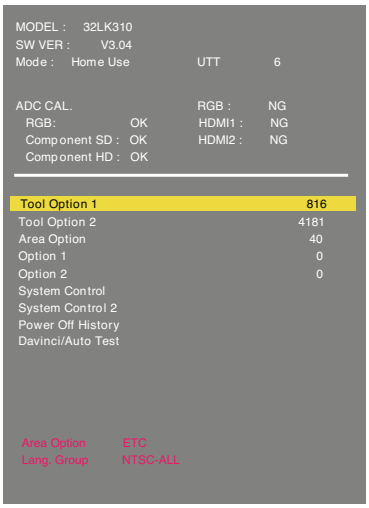
4.5. Check SW Version

(1) Method

1) Push In-star key on Adjust remote-control.

2) SW Version check

Check “SW VER : V3.xx”



5. PCB assembly adjustment method

5.1. Input Area-Option

(1) Profile : Must be changed the Area option value because being different of each Country’s Language and signal Condition.

(2) Equipment : Adjustment remote control.

(3) Adjustment method

- The input methods are same as other chassis.(Use IN-START Key on the Adjust Remote control.)

Refer to Job Expression of each main chassis assembly (EBTxxxxxxxx) for Option value.

5.2. Adjustment of White Balance

(For Automatic Adjustment)

- Purpose : Adjust the color temperature to reduce the deviation of the module color temperature.
- Principle : To adjust the white balance without the saturation, Fix the one of R/G/B gain to 192 (default data) and decrease the others.
- Adjustment mode : Three modes - Cool / Medium / Warm
- Required Equipment

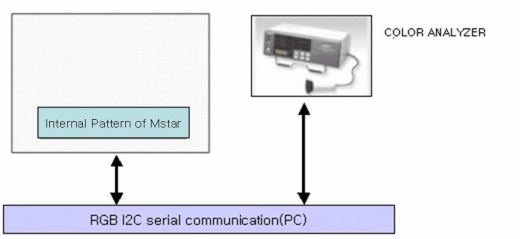
1) Remote control for adjustment

2) Color Analyzer : CA100+ or CA-210 or same product - LCD TV(ch : 9)

(should be used in the calibrated ch by CS-1000)

3) Auto W/B adjustment instrument(only for Auto adjustment)

5.2.1 Adjustment of White Balance (For automatic adjustment)



* LP91J Support RS-232C & I2C Interface For ADC/DDC Adjustment.

(1) Enter the adjustment mode of DDC

- Set command delay time : 50ms
- Enter the DDC adjustment mode at the same time heat-run mode when pushing the power on by power only key
- Maintain the DDC adjustment mode with same condition of Heat-run => Maintain after AC off/on in status of Heat-run pattern display)

(2) Release the DDC adjustment mode

- Release the adjust mode after AC off/on or std-by off/on in status of finishing the Hear-run mode
- Release the Adjust mode when receiving the aging off command(WB 00 FF) from adjustment equipment.
- Need to transmit the aging off command to TV set after finishing the adjustment.
- Check DDC adjust mode release by exit key and release DDC adjust mode)

(3) Enter the adjust mode of white balance)

- Enter the white balance adjustment mode with aging command (F3, 00, 00)

(4) Release the adjust mode of white balance

- Enter the white balance adjustment mode with aging command(F3, 00, FF)

* Luminance min value is 150cd in the Cool/Medium/Warm mode(For LCD)

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5.2.2. Adjustment of White Balance (for Manual adjustment)

(1) Color analyzer(CA100+, CA210) should be used in the calibrated ch by CS-1000

(2) Operate the zero-calibration of the CA100+ or CA-210, then stick sensor to the module when adjusting.

(3) For manual adjustment, it is also possible by the following sequence.

1) Select white pattern of heat-run by pressing “POWER ON” key on remote control for adjustment then operate heat run longer than 15 minutes. (If not executed this step, the condition for W/B may be different.)
2) Push “Exit” key.
3) Change to the AV mode by remote control.
4) Input external pattern (85% white pattern)
5) Push the ADJ key -> Enter “0000” (Password)
6) Select “3. W/B ADJUST”
7) Enter the W/B ADJUST Mode
8) Stick the sensor to the center of the screen and select each items (Red/Green/Blue Gain and Offset) using ▲/▼(CH +/-) key on Adjustment remote control.
9) Adjust R/G/B Gain using ◄/►(VOL +/-) key on Adjustment remote control.
10) Adjust three modes all (Cool/ Medium/ Warm) : Fix the one of R/G/B gain and change the others
11) When adjustment is completed, Enter “COPY ALL”.
12) Exit adjustment mode using EXIT key on Adjustment remote control.

* CASE

First adjust the coordinate far away from the target value(x, y).

1. x, y > target
   i) Decrease the R, G.
2. x, y < target
   i) First decrease the B gain,
   ii) Decrease the one of the others.
3. x > target, y < target
   i) First decrease B, so make y a little more than the target.
   ii) Adjust x value by decreasing the R
4. x < target, y > target
   i) First decrease B, so make x a little more than the target.
   ii) Adjust x value by decreasing the G

(4) Standard color coordinate and temperature when using the CA100+ or CA210 equipment

Mode	Coordinate		Temp	uvΔ
	x	y		
Cool	0.269 ± 0.002	0.273 ± 0.002	13,000 K	0.000
Medium	0.285 ± 0.002	0.293 ± 0.002	9,300 K	0.000
Warm	0.313 ± 0.002	0.329 ± 0.002	6,500 K	0.003

- 22LK310/311(Small size inch’s color coordinate is different from others, so use below table.)

Mode	Coordinate		Temp	uvΔ
	x	y		
Cool	0.285 ± 0.002	0.293 ± 0.002	9,300 K	0.000
Medium	0.295 ± 0.002	0.305 ± 0.002	8,000 K	0.000
Warm	0.313 ± 0.002	0.329 ± 0.002	6,500 K	0.003

- To check the Coordinates of White Balance, you have to measure at the below conditions.
  Picture Mode : Select Vivid and change Dynamic Contrast : Off, Dynamic Colour : Off -> Picture Mode change -> Vivid(User)
  (If you miss the upper condition, the coordinates of W/B can be lower than the spec.

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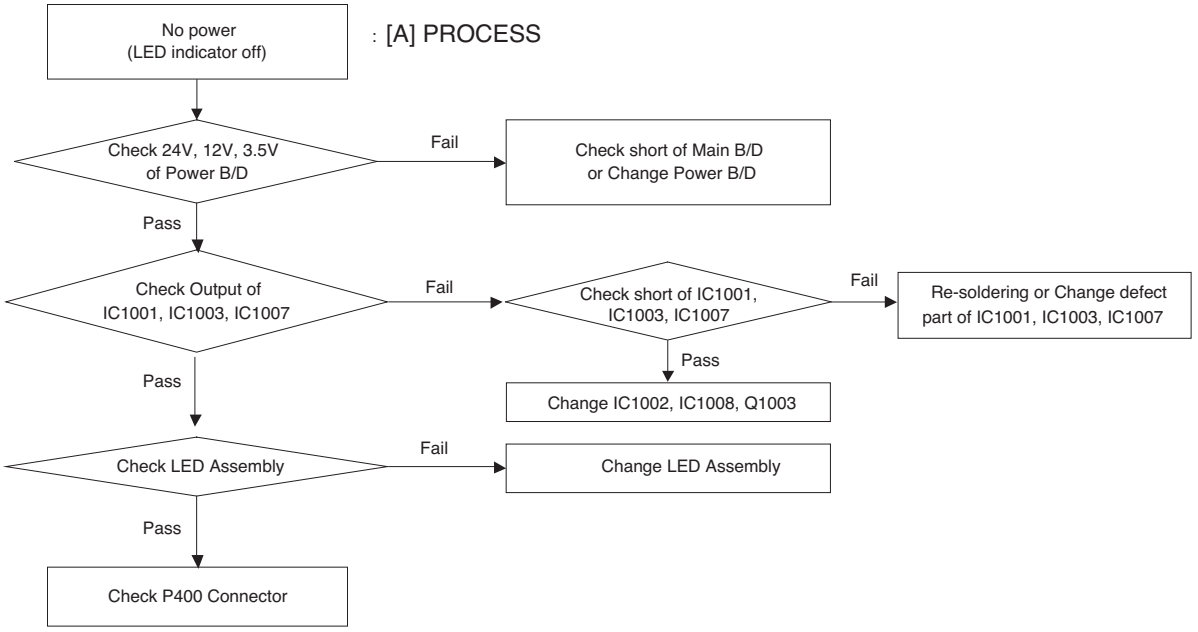
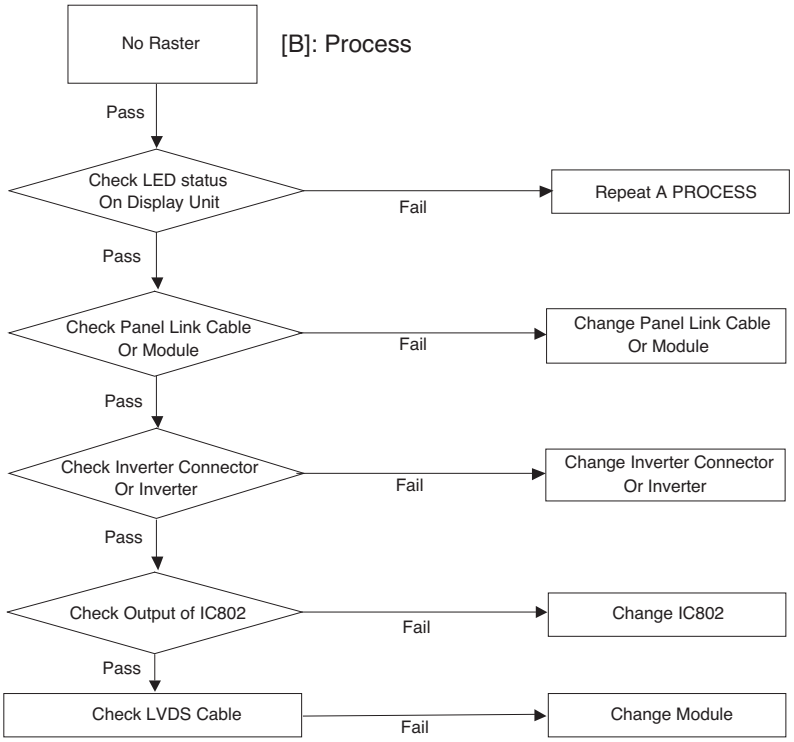
TROUBLESHOOTING





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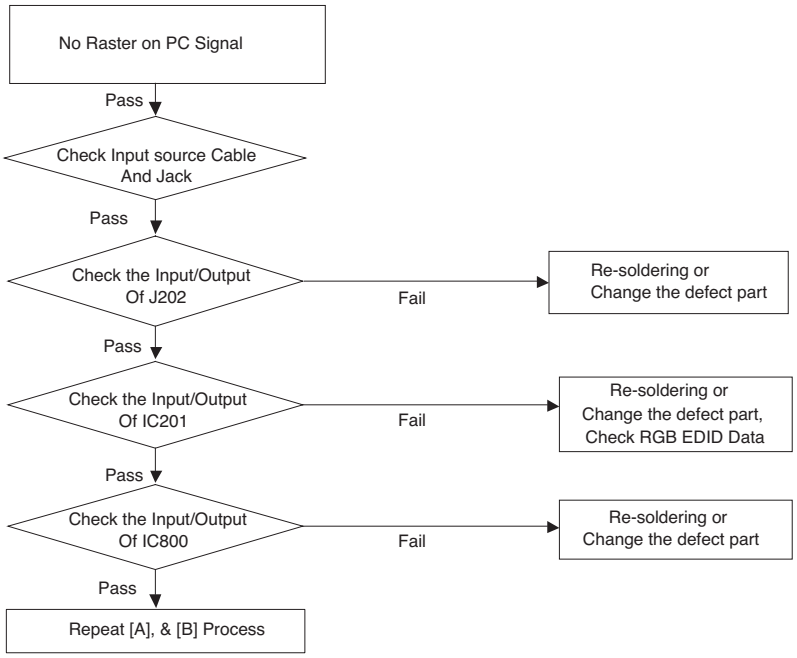

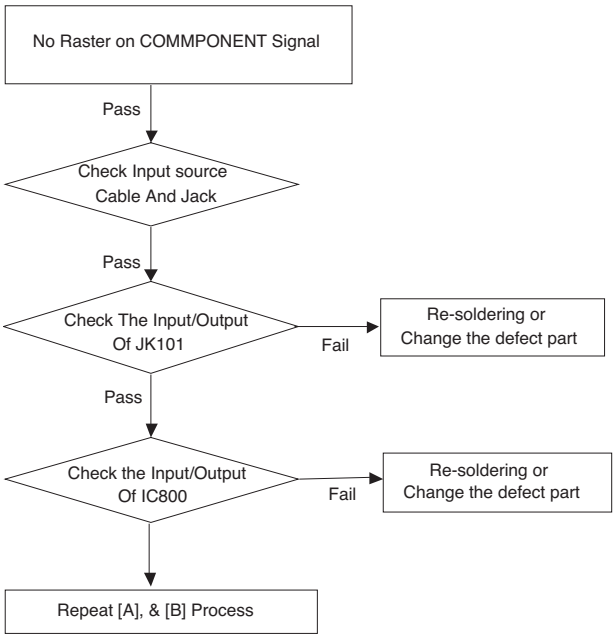

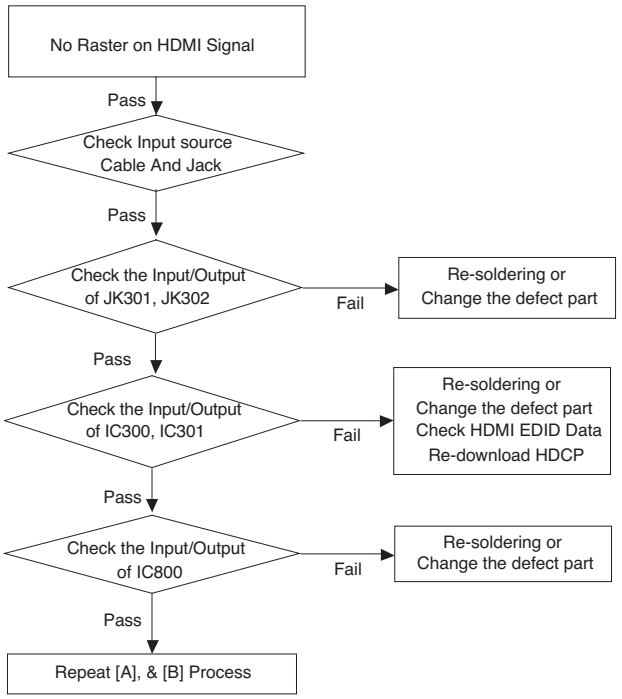

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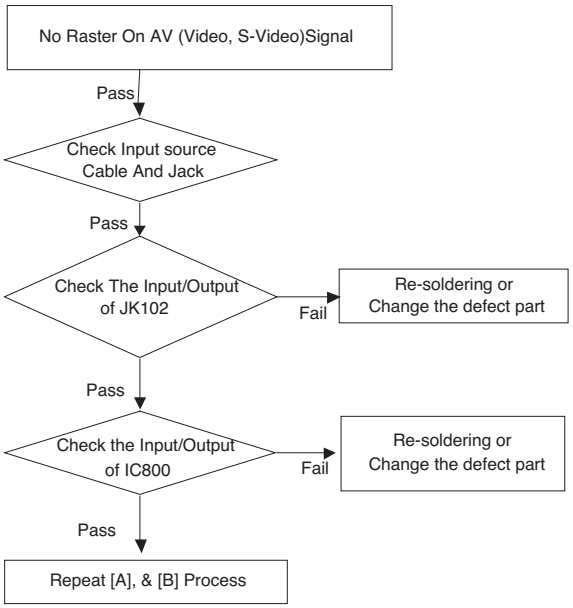

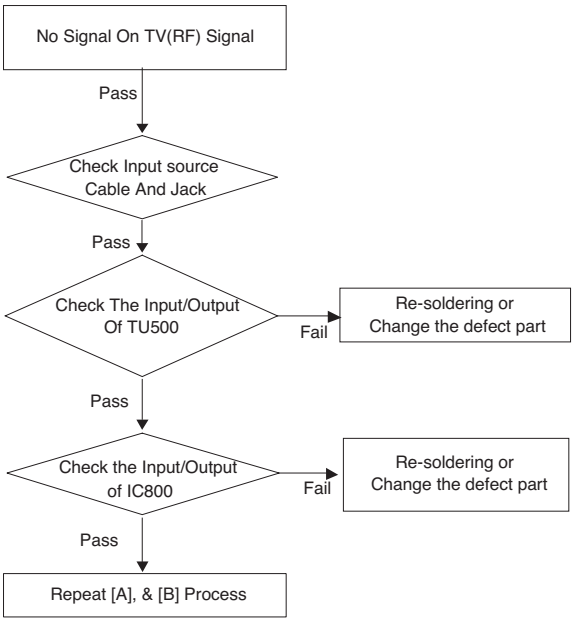

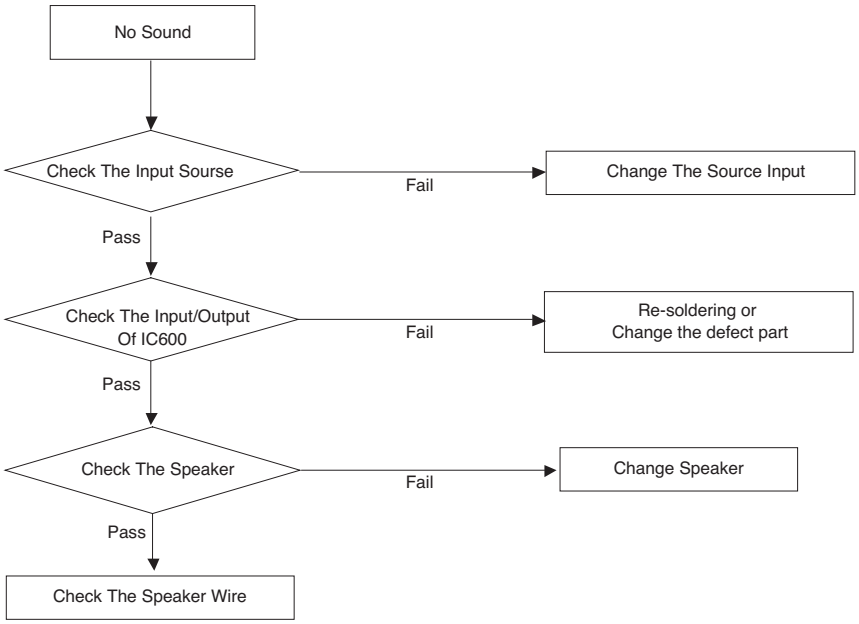

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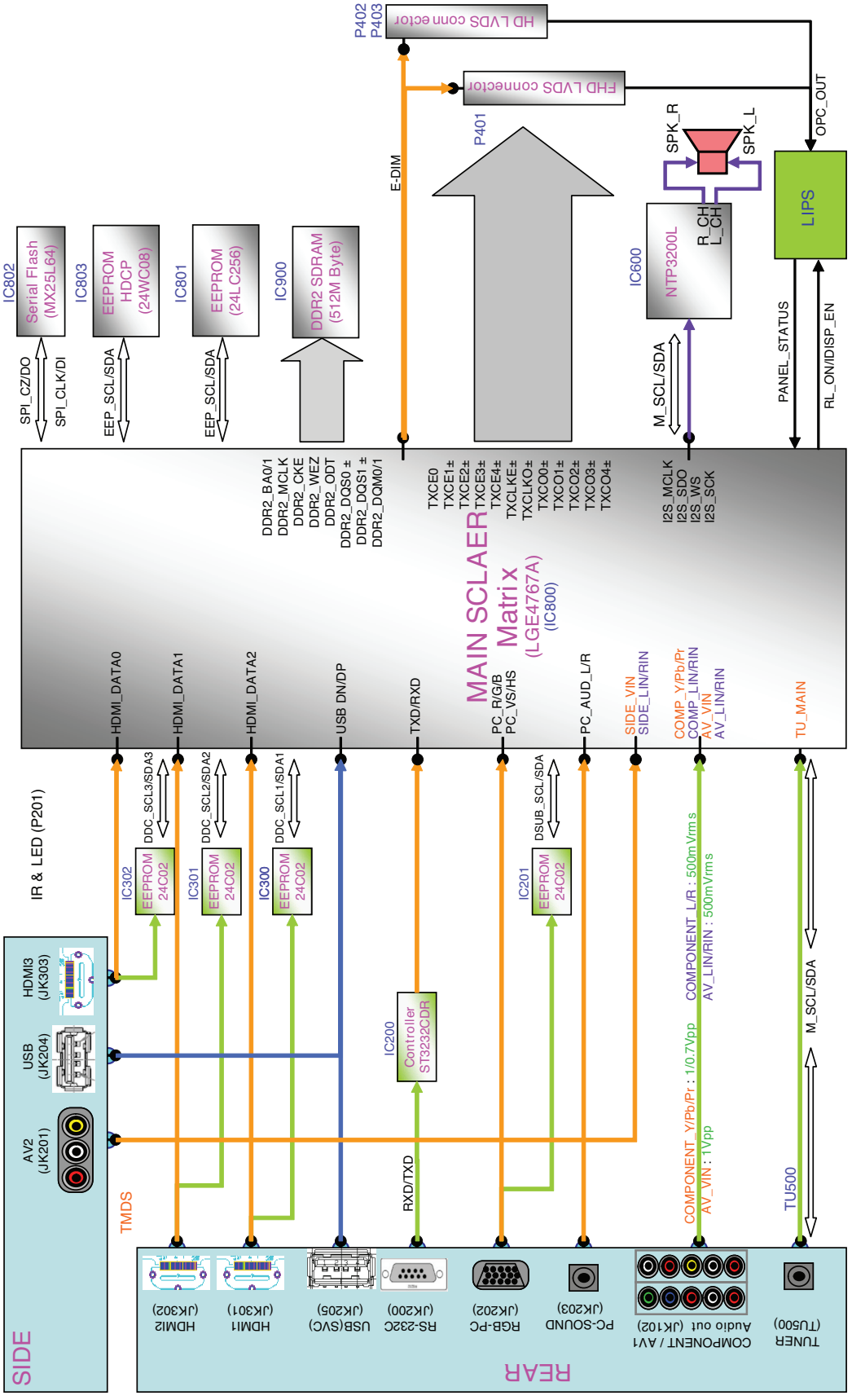
BLOCK DIAGRAM



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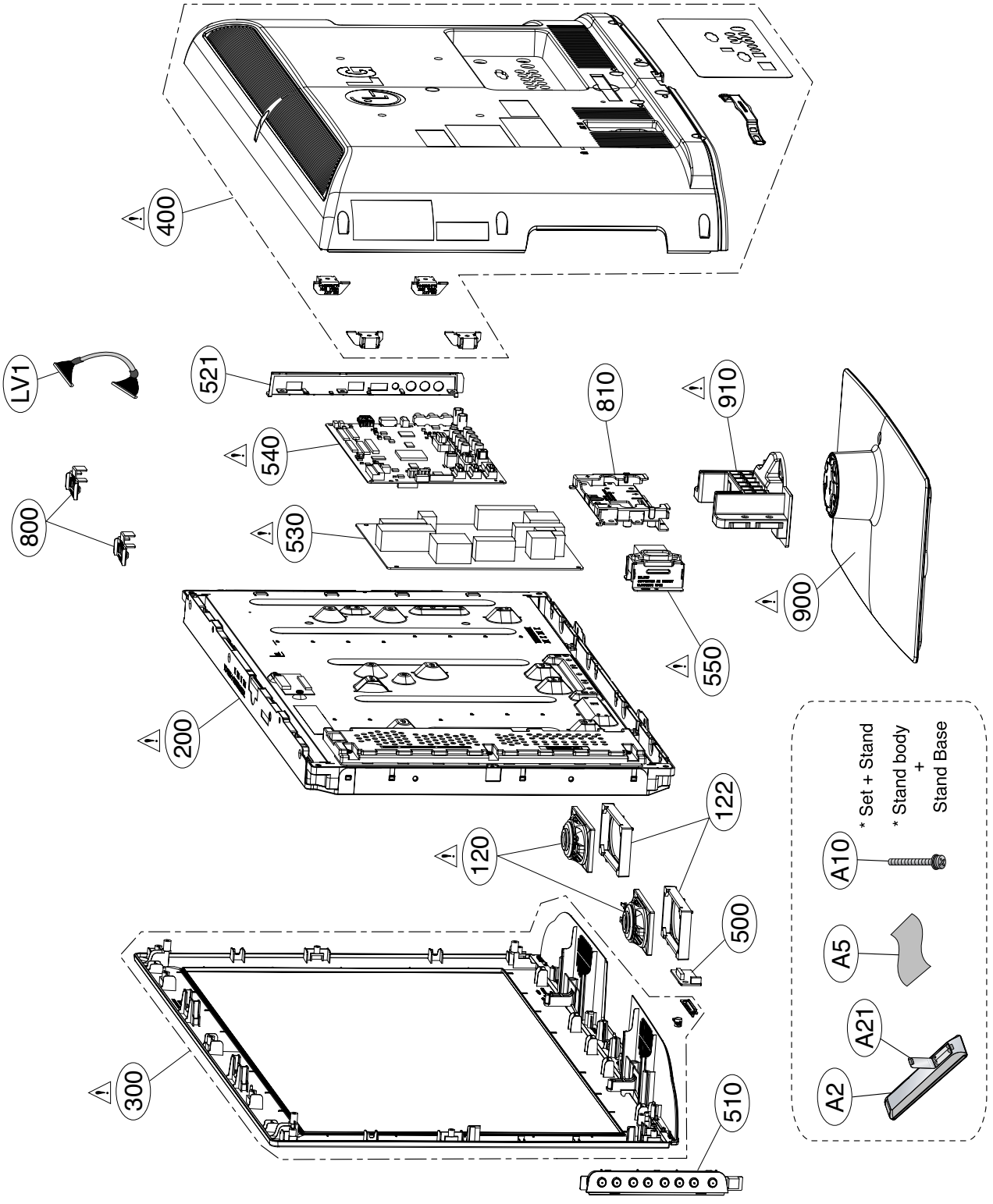
EXPLODED VIEW

IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by ⚠ in the Schematic Diagram and EXPLODED VIEW.
It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent X-RADIATION, Shock, Fire, or other Hazards.
Do not modify the original design without permission of manufacturer.



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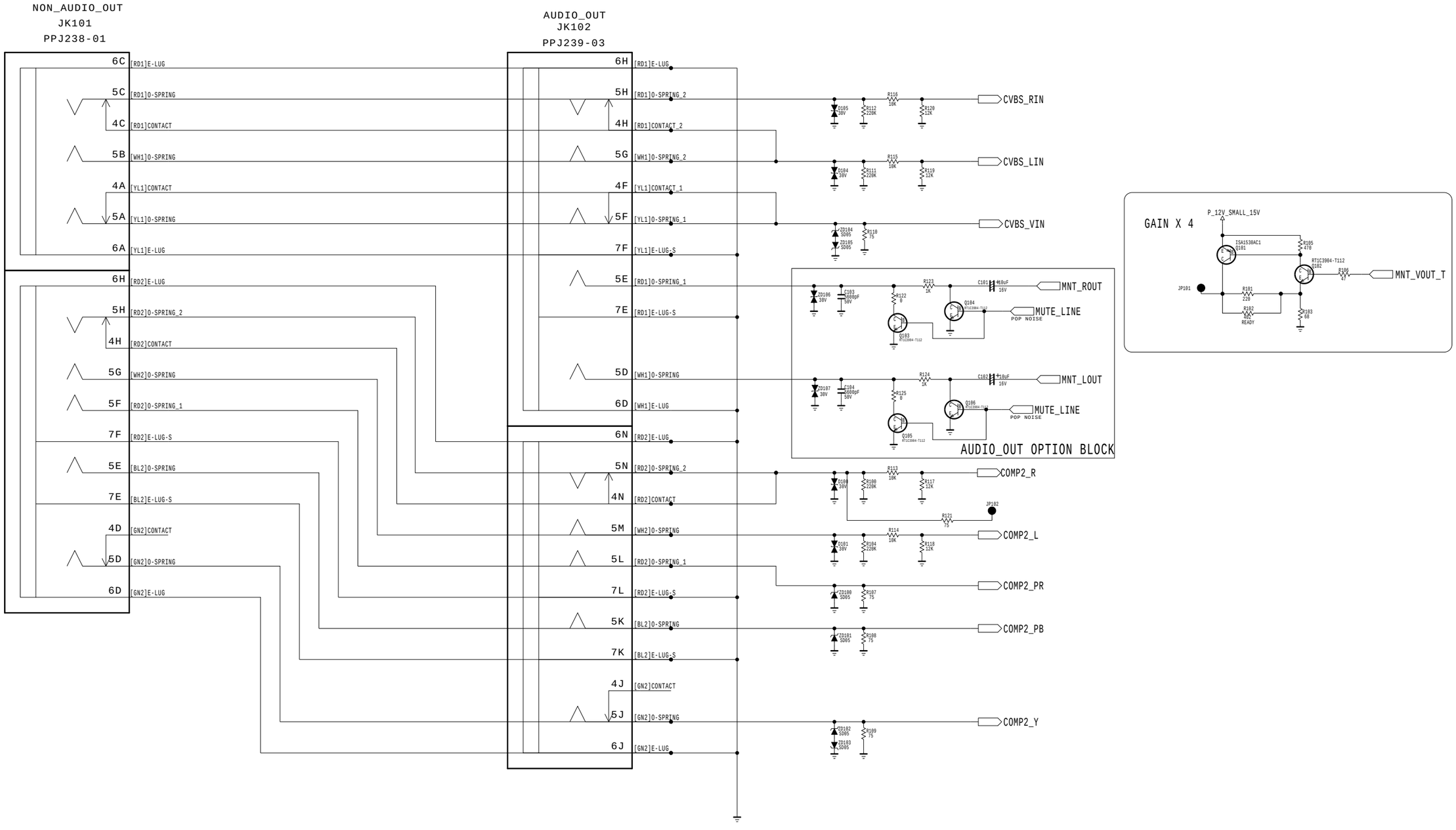
COMPONENT / AV IN / AV AUDIO OUT



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MODEL	LK310	DATE	2010/11/22
BLOCK	INPUT1	SHEET	1/9

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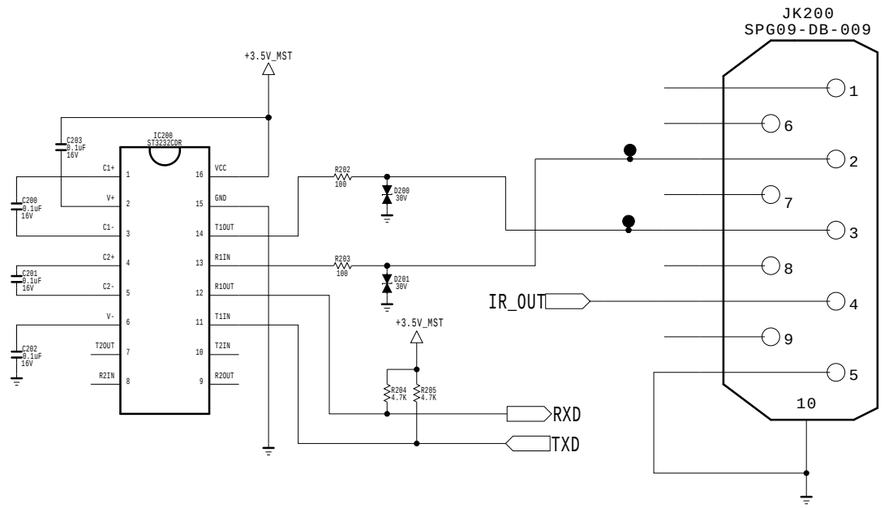
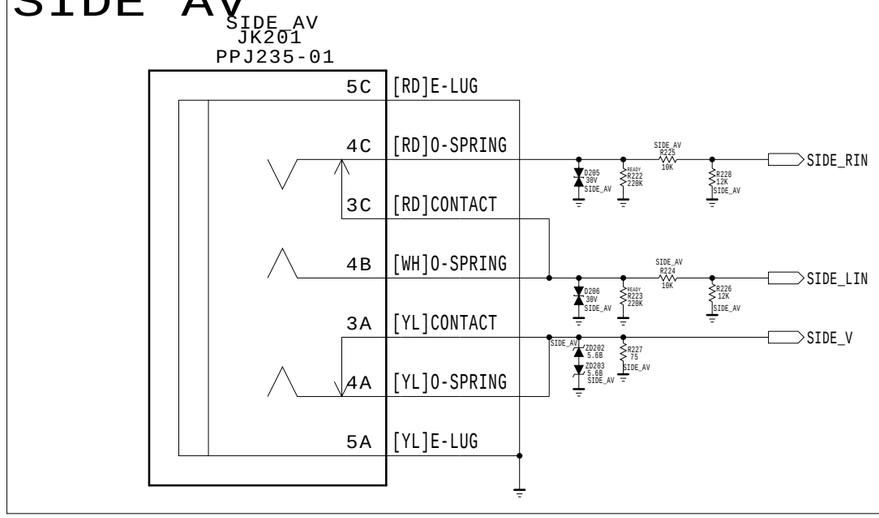
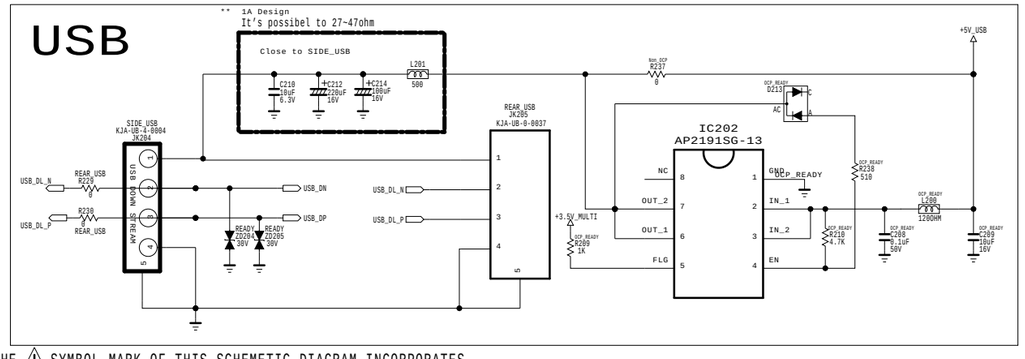
RS-232C



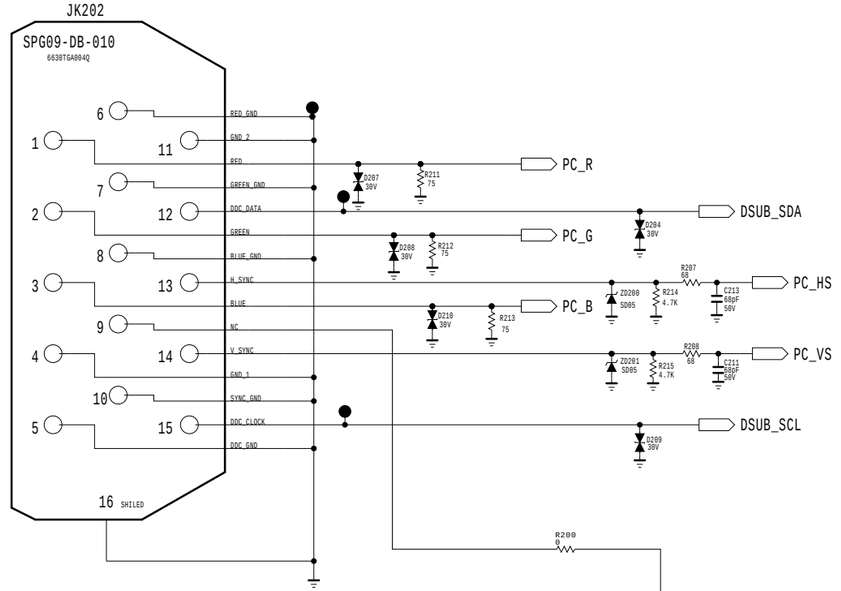
SIDE AV



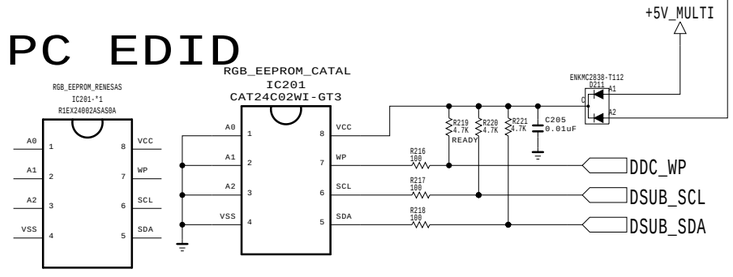
USB



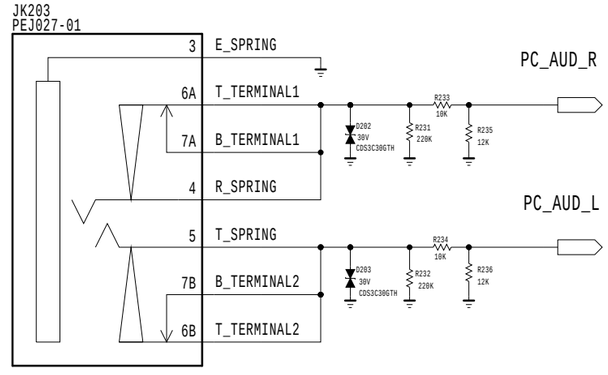
PC



PC EDID



PC SOUND



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MODEL	LK310	DATE	2010/11/22
BLOCK	INPUT2	SHEET	2 / 9

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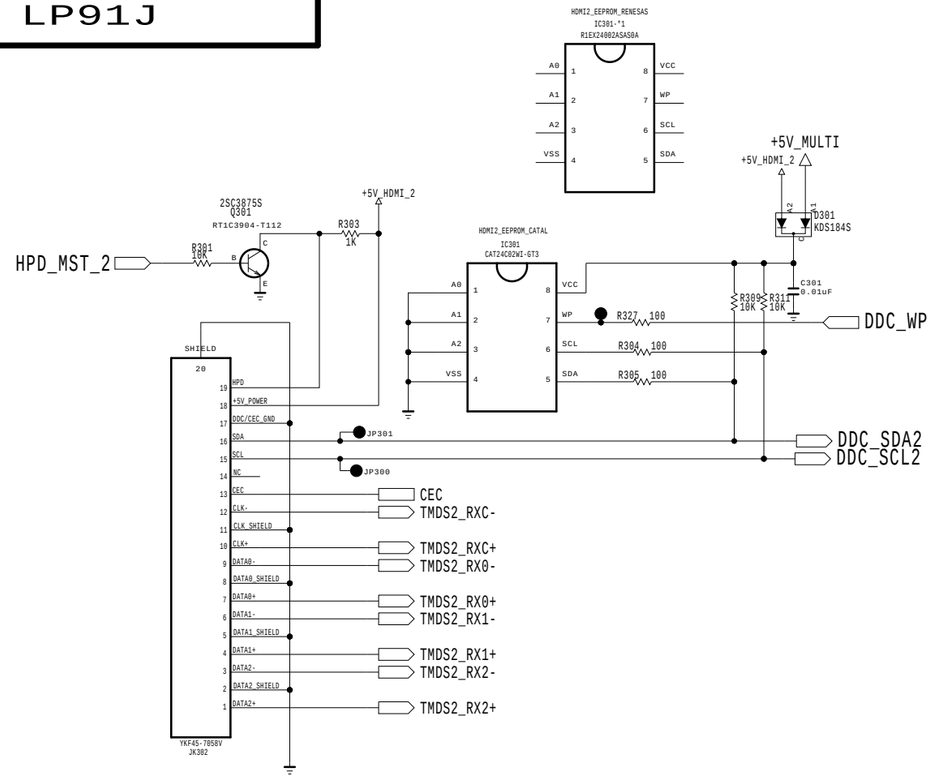
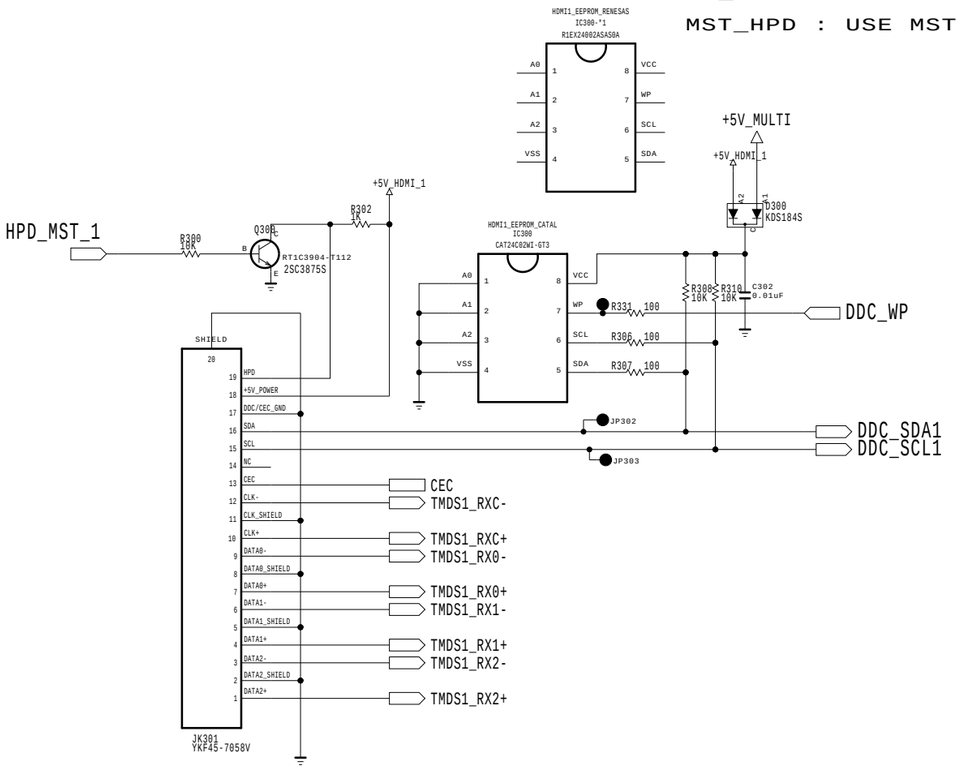
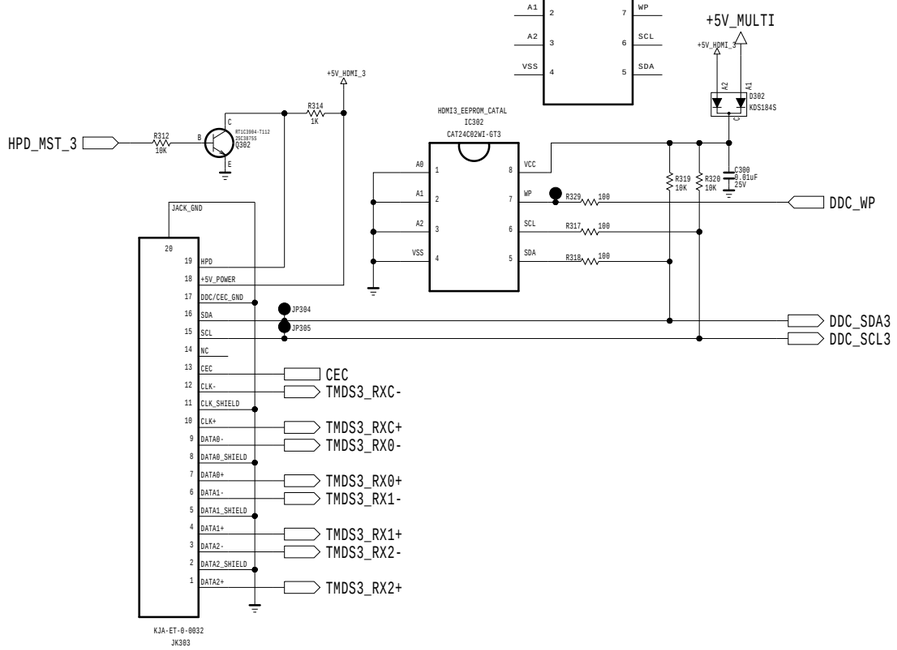
OPTION

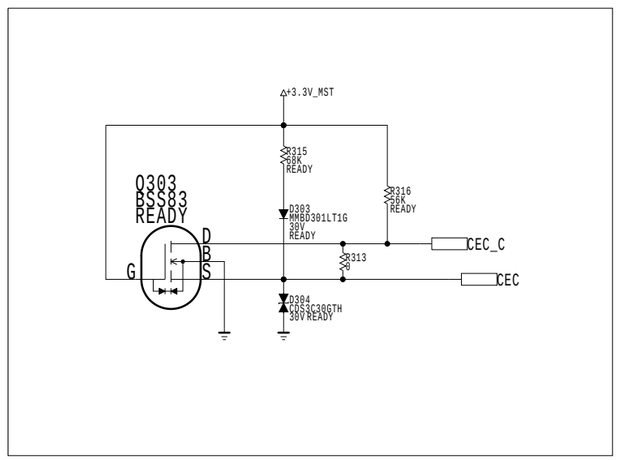
SW_HPD : USE SW HPD (Default)

MST_HPD : USE MST HPD









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BLOCK	HDMI	SHEET	3/9

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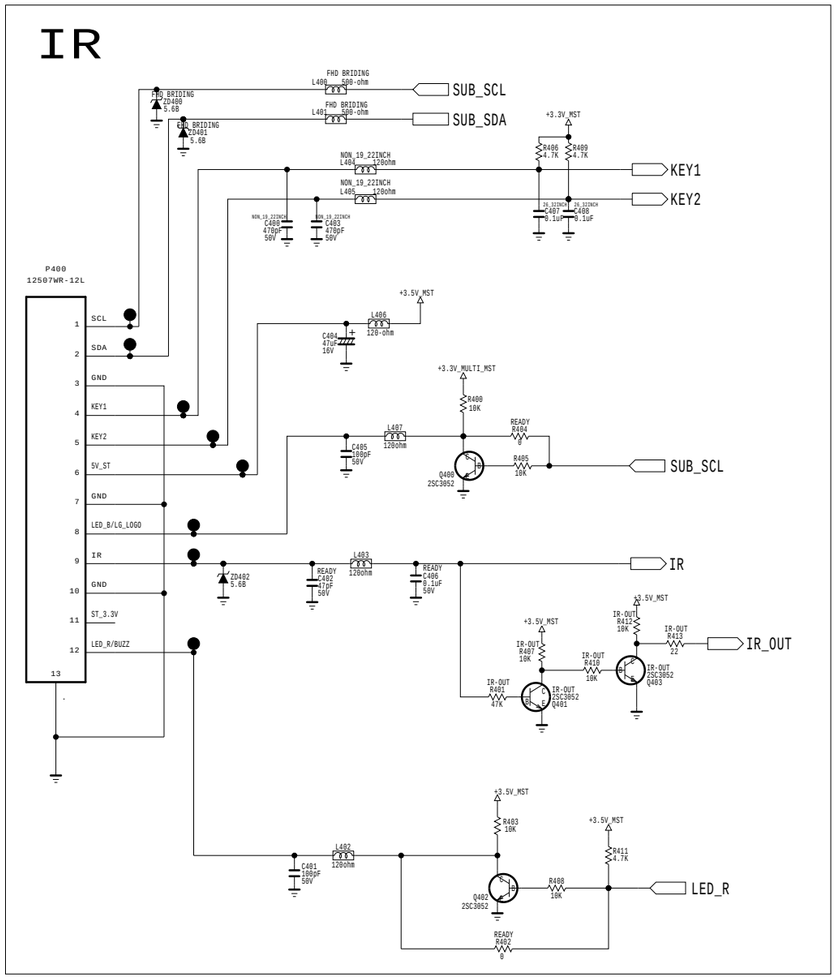
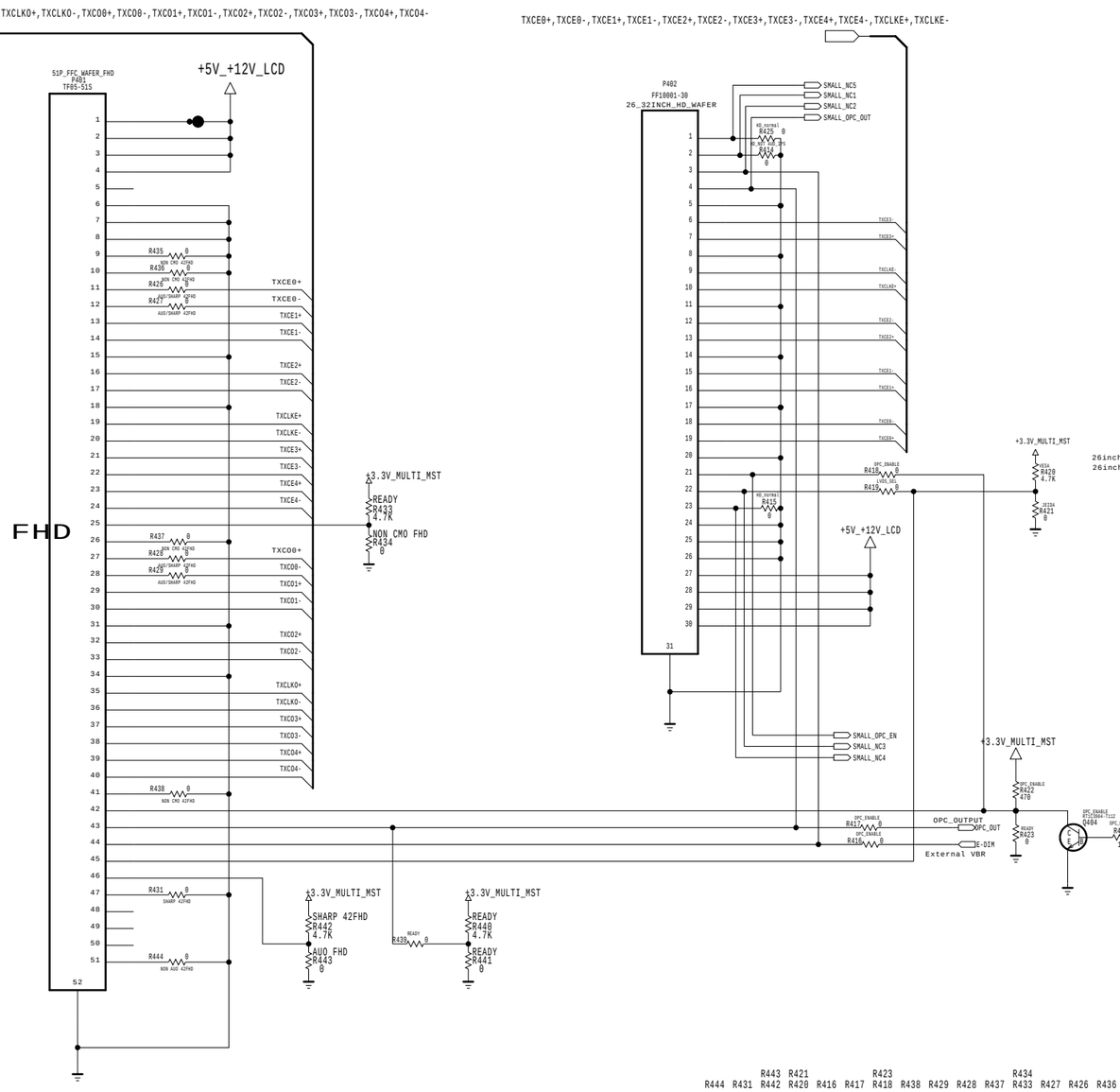
PANEL WAFER





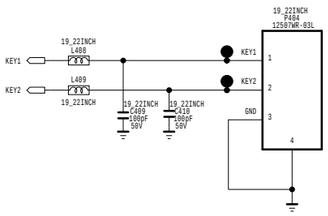
26inch AUO : OPEN
26inch SHARP : Pull down

**OPC_ENABLE : USE LGD Module

	R444	R431	R443 R442	R421 R428	R416	R417	R423 R418	R438	R429	R428	R437	R434 R433	R427	R426	R436	R435
	51	47	46	45	44	43	42	41	28	27	26	25	12	11	10	9
SHARP 32INCH FHD	O	X	X	X VESA	X	X	X	O	O	O	O	R434	O	O	O	O
IPS 32INCH FHD	O	X	X	X VESA	X	X	X	O	X	X	O	R434	X	X	O	O

SHARP 32INCH FHD

CONTROL KEY



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BLOCK	LVDS, CTR KEY	SHEET	4/9

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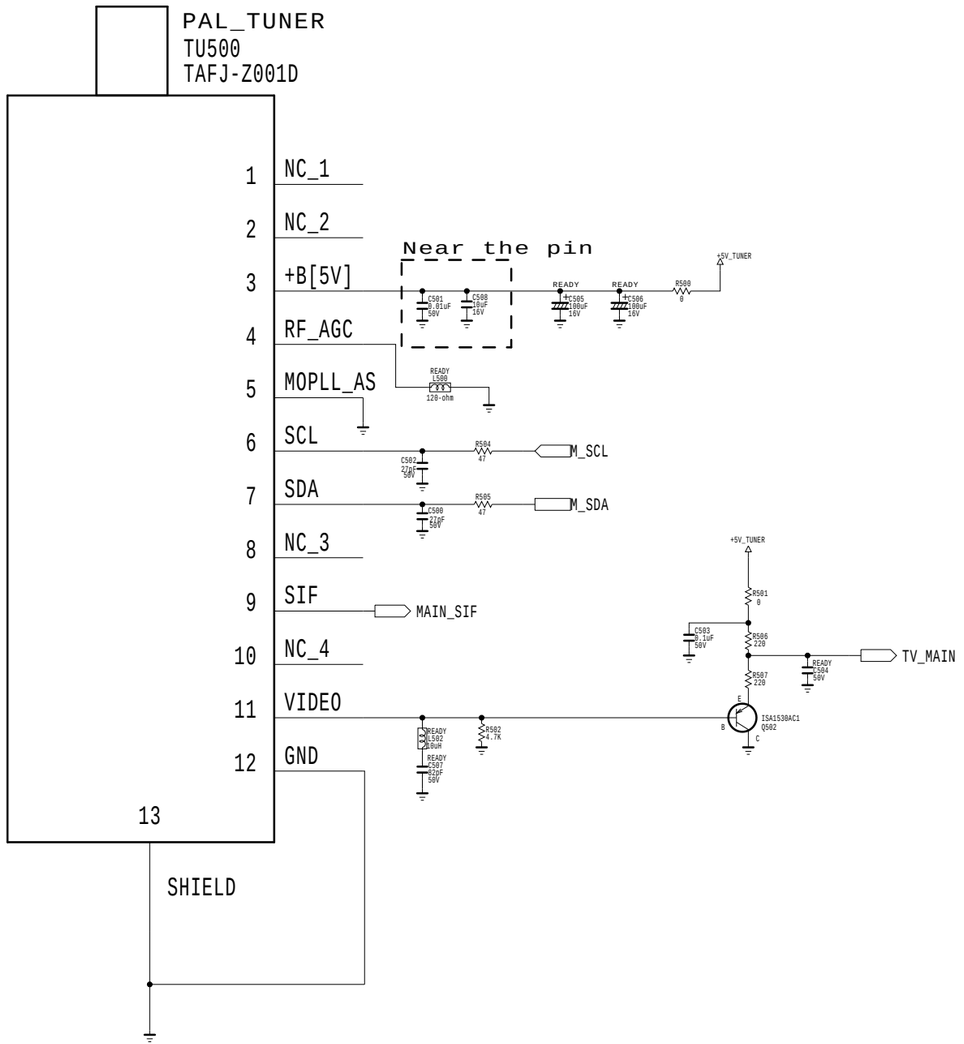

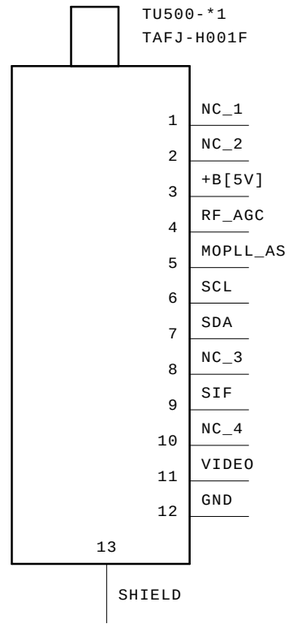

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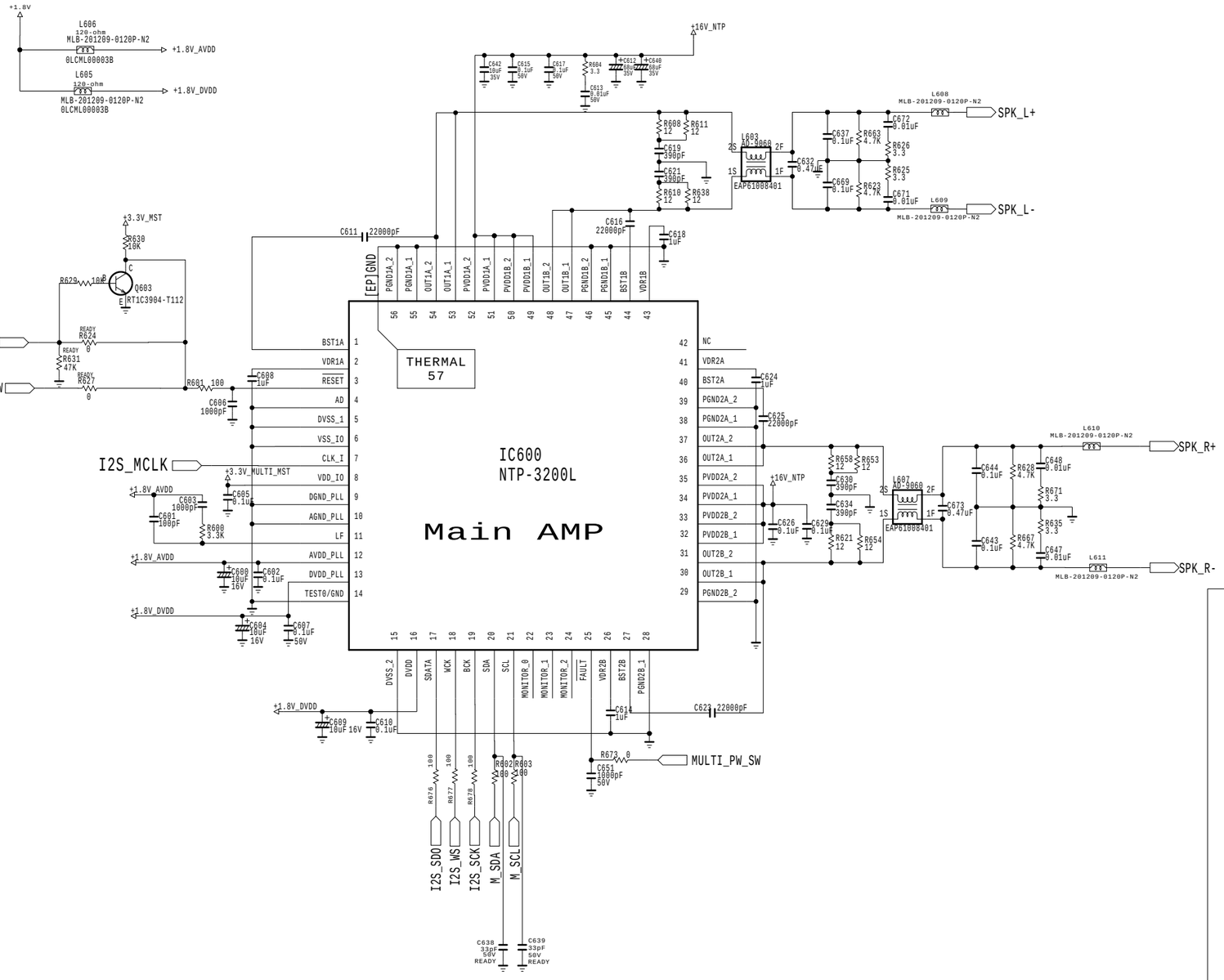

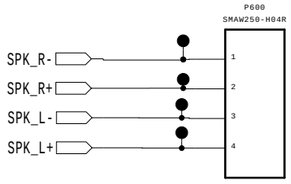

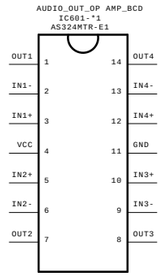

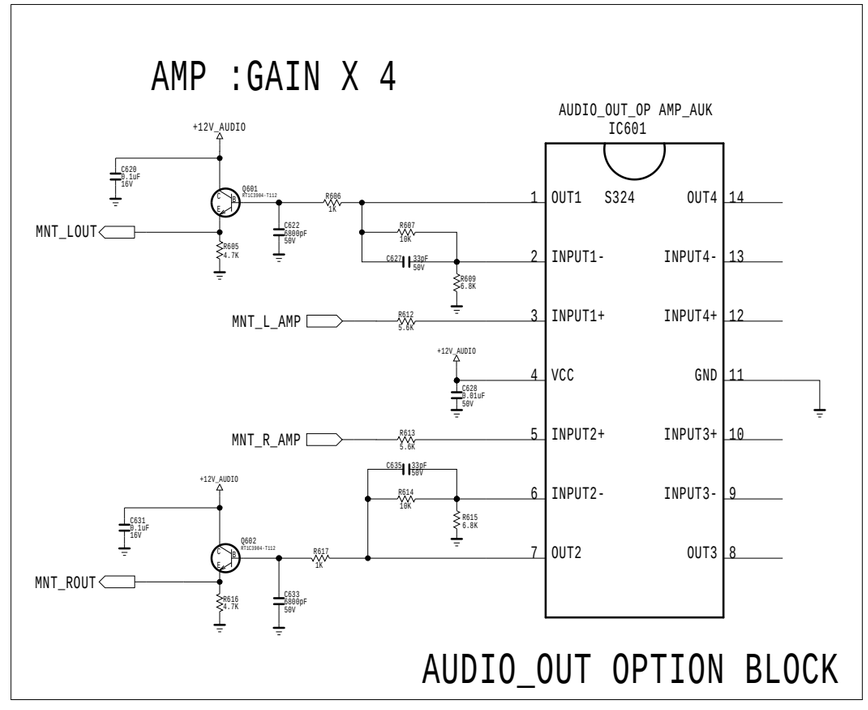

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BLOCK	AUDIO	SHEET	6/9

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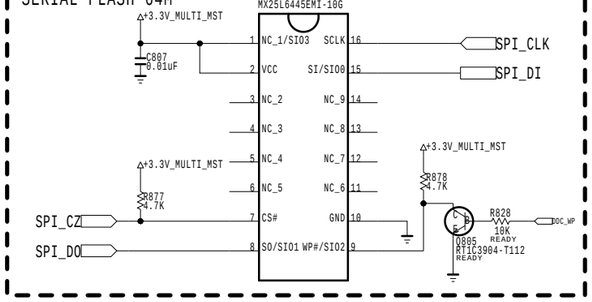
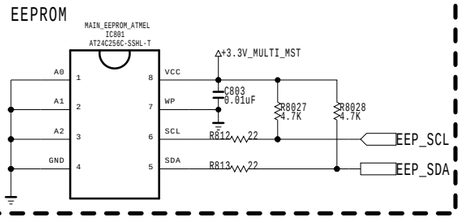
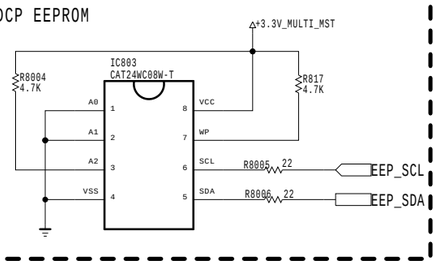
SERIAL FLASH 64M



EEPROM



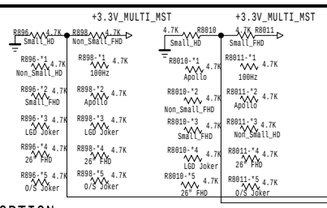
HDCP EEPROM

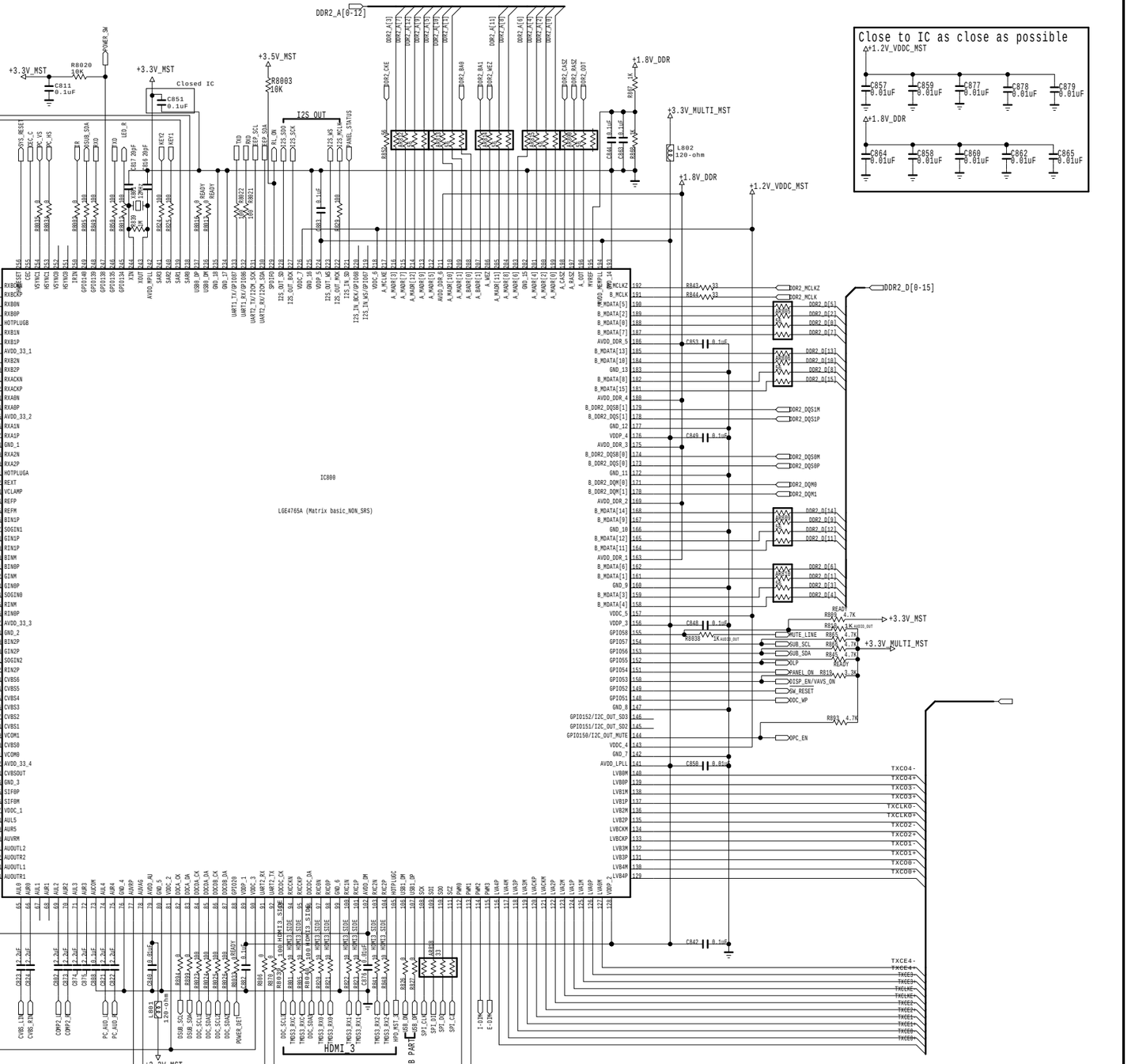


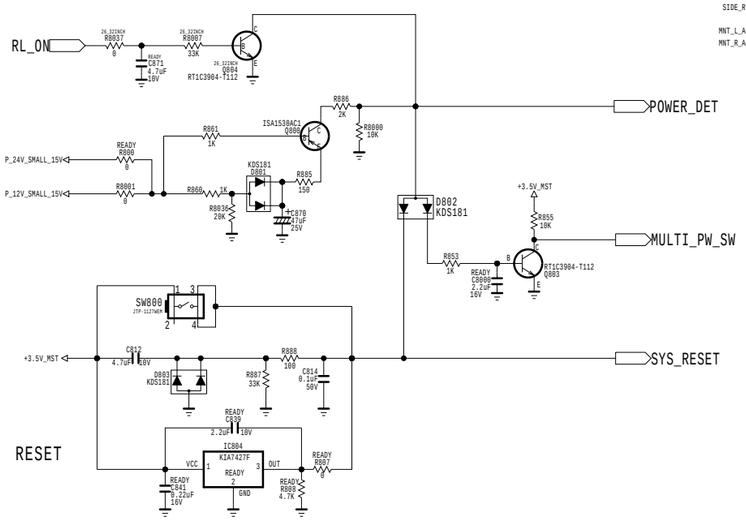
*H/W OPTION

	R896	R898	R8010	R8011
Small HD	4.7K	X	4.7K	X
Small FHD (22")	4.7K	X	4.7K	4.7K
Non Small HD	4.7K	X	X	4.7K
LGD Joker	4.7K	4.7K	4.7K	X
26" FHD	4.7K	4.7K	4.7K	4.7K
O/S Joker	4.7K	4.7K	X	4.7K
Non Small FHD	X	4.7K	4.7K	X
Apollo	X	4.7K	4.7K	4.7K
100HZ	X	4.7K	X	4.7K

** Small HD : 19/22/26 Inch
** Non Small FHD : Normal(non 100Hz) FHD Model
** LGD Joker : LF Series (10BIT FHD, LED ON/OFF)
** O/S Joker : LF Series (8BIT FHD, LED ON/OFF)
** Small FHD (22") : 8BIT,LED ON/OFF
** 26" FHD : 10BIT,LED ON/OFF







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BLOCK	MSTAR	SHEET	7/9

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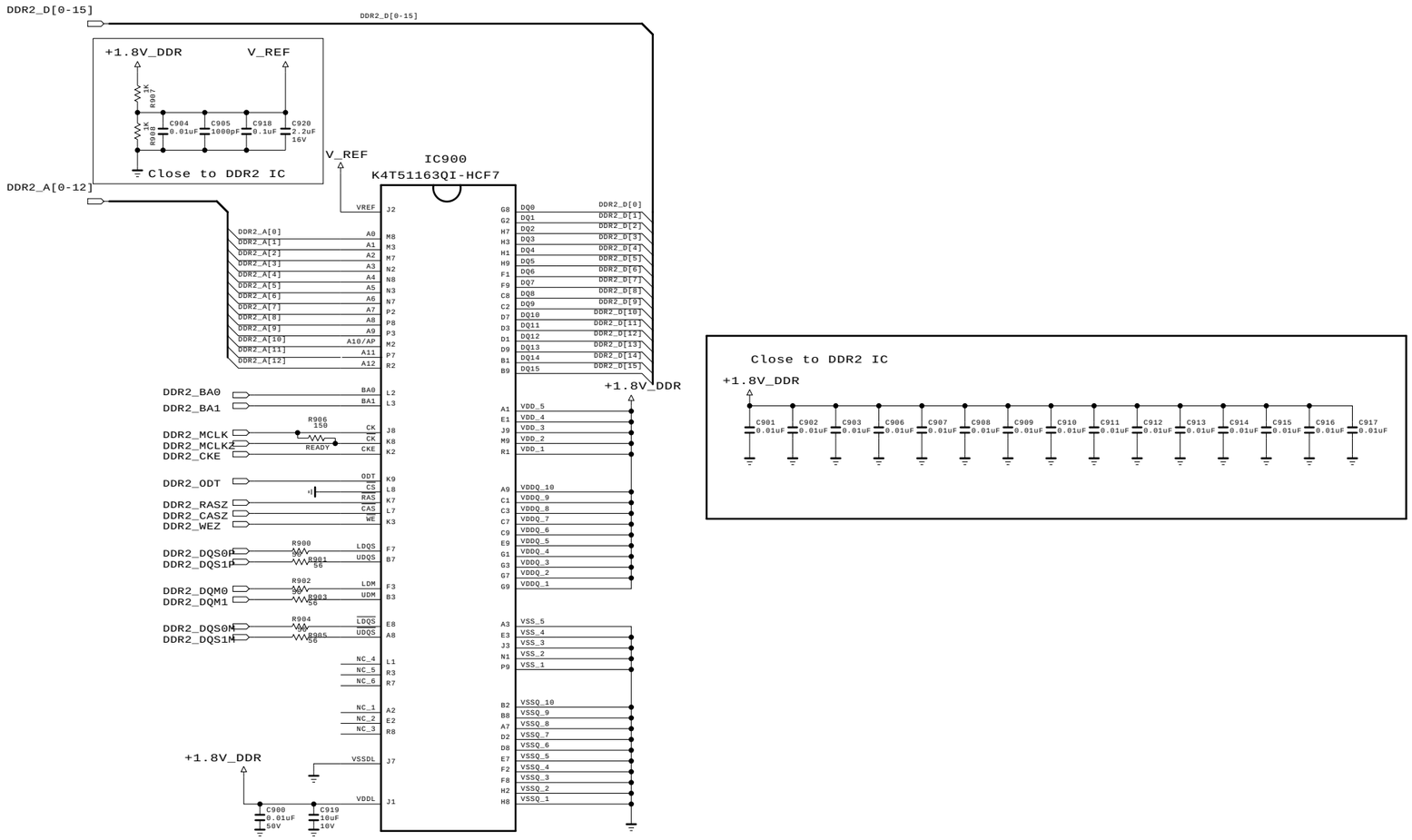
DDR2



DDR2 MEMORY

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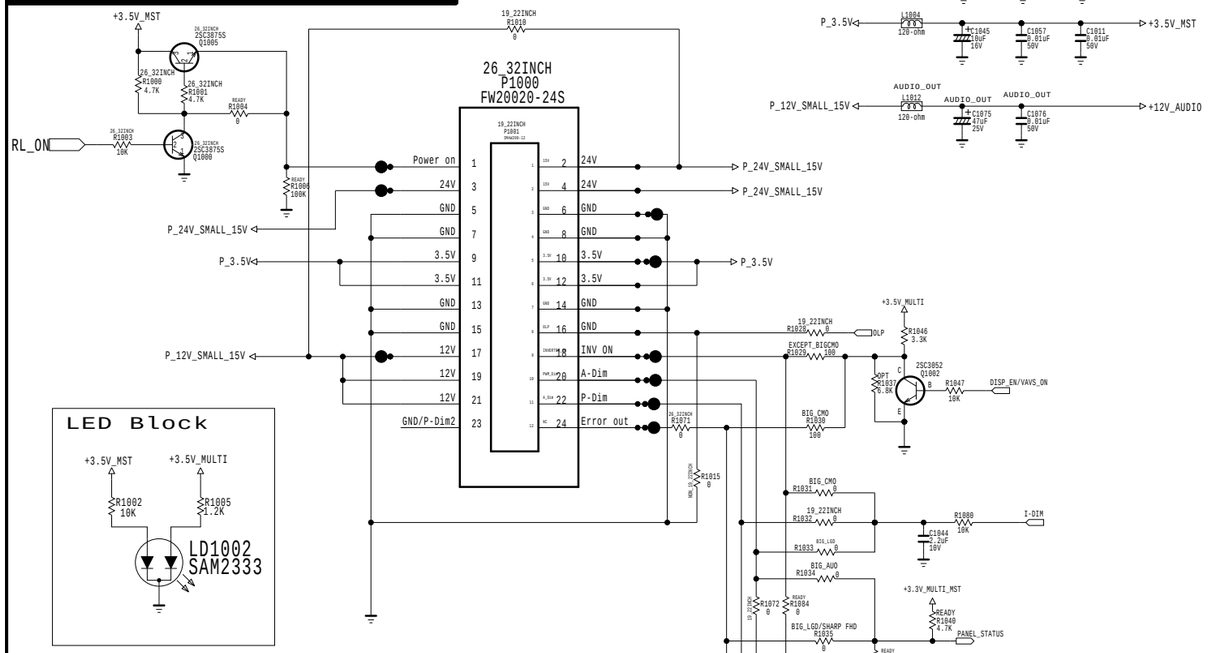
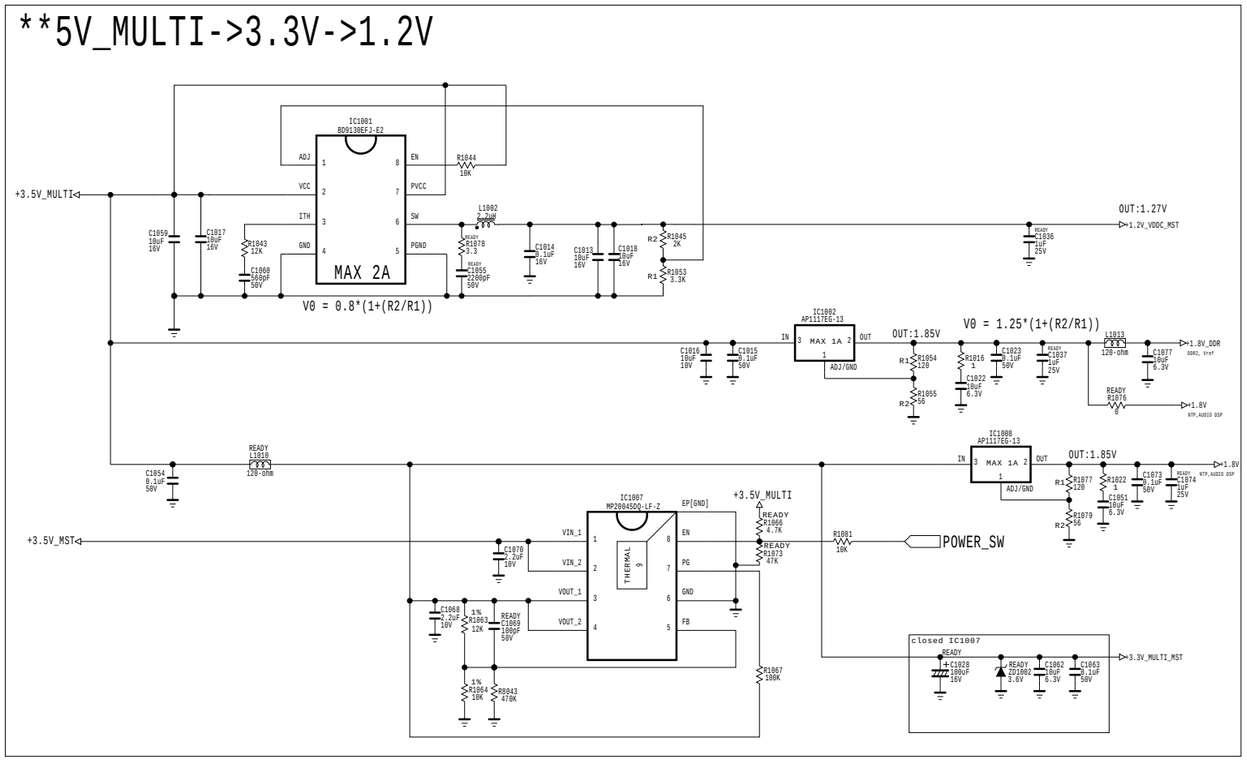


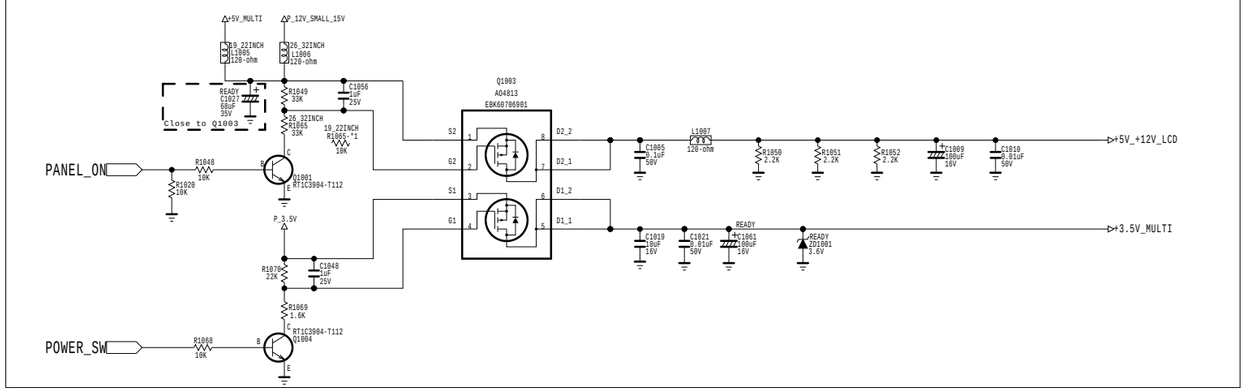
<OS MODULE PIN MAP>

PIN No	LGD	CMO(09)	AUO	SHARP	IPS	SMALL
18	INV_ON	A-DIM	INV_ON	INV_ON	INV_ON	INV_ON
20	V4:VBR-A V5:VBR-A	Err_out	Err_out	NC	Err_out	PWM_DIM
22	PWM_DIM	PWM_DIM	NC	PWM_DIM	NC	A-DIM
24	Err_out	INV_ON	PWM_DIM	GND	PWM_DIM	NC

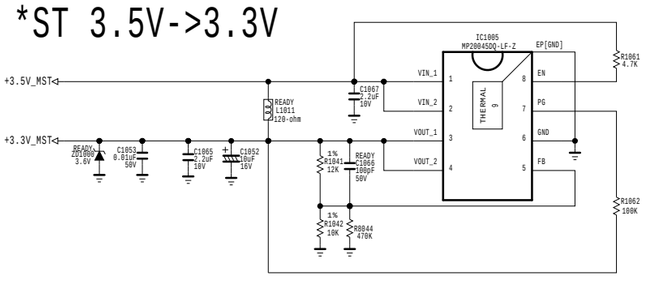
**5V_MULTI->3.3V->1.2V



**Switch 12V:P12V **Switch 3.5V:3.5.V_MULTI

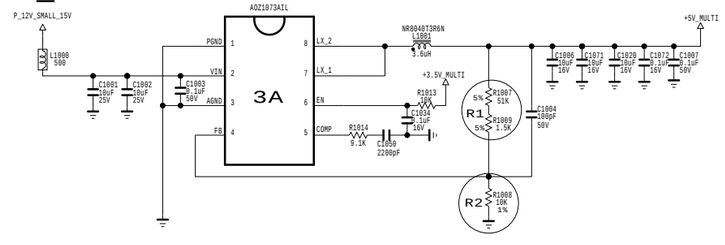


*ST 3.5V->3.3V



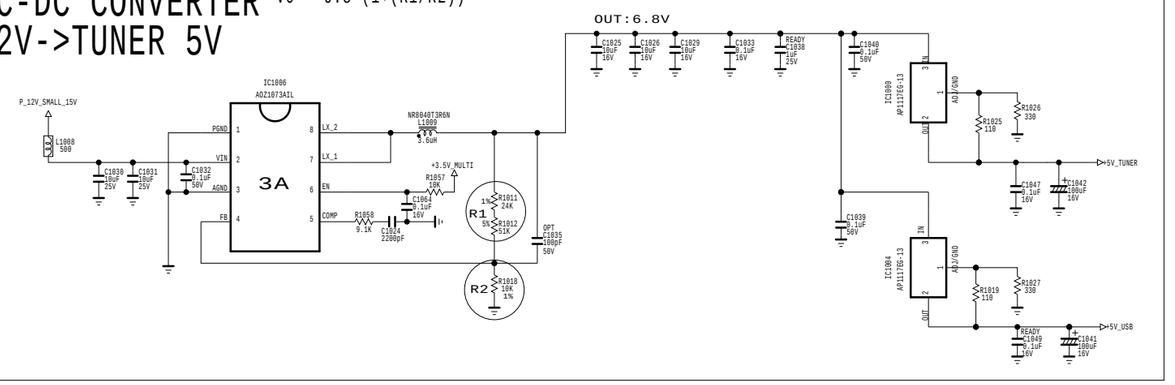
**DC-DC CONVERTER *12V -> 5V_MULTI

V0 = 0.8*(1+(R1/R2))



**DC-DC CONVERTER **12V->TUNER 5V

V0 = 0.8*(1+(R1/R2))



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BLOCK	POWER	SHEET	9 / 9

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